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Long-term care for older people: A global perspective

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Long-term care for older people: A global perspective

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Editorial: Long-term care for older people: A global perspective

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Editorial on the Research Topic
Long-term care for older people: A global perspective

Introduction

Long-term care is essential to the quality of life of older people. It enables older people to maintain a level of functional capability consistent with their basic rights, freedoms, and human dignity. As population aging continues to accelerate across the world, meeting the rising demand for long-term care is set to be a global challenge facing many societies. Not only should the long-term care system of a country be sustainable and efficient in care production in the long run, but it must also ensure the adequacy and quality of care, promote distributive fairness for every member of society, and contribute to broader societal aims such as gender equality.

A thorough investigation of long-term care for older people is a fundamental step if we want to build a sustainable and resilient long-term care system. This Research Topic aims to promote a better understanding of the demographic, social, and economic dimensions of long-term care utilization and provision and their implications for policies and the wellbeing of older people and their families. So far, much of the debate, policy interventions and empirical evidence on long-term care have centered on high-income countries, with the exception of transnational care where care workers in low and middle-income countries migrate to high-income countries to provide care. However, by 2050, an estimated 80% of older people will be living in middle and low-income countries (1). There are nine studies in this Research Topic with contributing authors from diverse geographical contexts and academic disciplines. A wide range of topics is covered by those studies.

Key issues in long-term care for older people

In the global context of population aging, a shortage of labor force in the long-term care sector is an urgent issue many countries need to address. Two studies in the Research Topic have looked into this issue. Roland et al. focused on reasons for turnover and absenteeism among personal assistants (PAs) in England. They found that distance traveled to work and number of PAs employed by individual employers are strongly associated with sick leave taken by PAs. Based on evidence from England, Teo et al. studied the relationship between turnover,

hiring and employment growth in the long-term care sector. Their analyses demonstrate that care worker turnover and recruitment are negatively related, and that rising vacancies are associated with a decline in employment.

Effective and high-quality service delivery is the key to creating a positive and supportive environment for those using long-term care. Rosteius et al. studied Green Care Farms as innovative and alternative long-term care environments in comparison to regular nursing homes in the Netherlands. They argued that how a care organization is designed significantly impacts residents' daily life and their mental, physical and social functioning. They called for leaders in the long-term sector to rethink existing ways of care delivery. The COVID-19 pandemic posed great challenges to service delivery for older people living in care homes. As older people were disproportionately affected by the pandemic, governments faced considerable difficulties in identifying and implementing effective protective measures for older care home residents. Das observed that, in the case of Hong Kong, China, this was further complicated by poorly designed indoor environments in care homes with inadequate ventilation and cramped spaces. The author argued that fundamental reforms to healthcare systems, updating the antiquated regulations, and continued optimization of the built environment are needed to turn long-term care facilities into positive spaces for caregiving.

Family caregivers will continue to play an indispensable role across different countries in the foreseeable future. In high-income countries such as the US, although formal care increased over the decades, informal caregivers are still crucial in terms of supporting the long-term care sector (2). In some low-income countries, long-term care responsibilities are almost exclusively assumed by family caregivers. Caregivers may face especially challenging tasks when they provide care for older people with certain health conditions such as dementia, stroke, or cancer. As such, a better understanding of the challenges and consequences associated with family caregiving is vitally important. In this Research Topic, research conducted by Nia et al. focused on developing and validating the Care Challenge Scale (CCS) for family caregivers of people with Alzheimer's disease in Iran. The results of the confirmatory factor analyses show that their 10-item scale has good validity, internal consistency, and stability in the Iranian long-term care setting that can be used by therapists, nurses, and researchers to assess the challenges faced by this group.

It is notable that more countries have in recent years treated increasing the capacity of formal care services as a government priority. A case in point is mainland China. Zhang et al. reported that mainland China has witnessed a rapid increase in government policies relating to formal long-term care services in the past decade. On examining the care policies developed by the Chinese government between 2011 and 2019, they found that the comprehensiveness and consistency of policy instruments are associated with rising capacity in care institutions. This shows different paths of policy development when compared with, for example, Europe, where the stated aim has been enhancing aging in place.

China has introduced pilot long-term care insurance schemes in 29 cities across the country since 2016. Drawing on data collected in the city of Guangzhou, Peng et al. found that people's understanding of and satisfaction with long-term care insurance policies are associated with heightened trust in those policies. Liu et al. developed a set of service capability indicators for long-term care facilities in China. Based on a Delphi consultation, their index system comprised 31 individual indicators across six subdimensions including staffing, facilities and equipment, funding, medical inspection services, health management services, and institutional standards.

Building capacity for formal care services is a direct response to the expected increase in demand for long-term care in the coming decades, to ensure that care needs in the older population can be adequately met. The international literature has shown increased attention to and interest in unmet long-term care needs. Based on latent profile analyses, Cao et al. demonstrate that unmet long-term care needs are significant risk factors for poor health in the Chinese older population. Their study points to the important role of adequate levels of care in promoting healthy aging.

Conclusion

Long-term care policy is a multi-faceted issue that calls for multi-stakeholder solutions. Rising demand for care and labor shortages prompt policymakers, caregivers, service users, and researchers to rethink the existing models of care delivery and to map out pathways for preventing unmet needs and care poverty in the older population. Governments should make sure that sufficient funding and financial investment are put in place to support caregivers and people with care needs. This is a fundamental issue if a country wants its long-term care system to function satisfactorily. However, addressing the challenges associated with long-term care is not only about funding. Identifying and monitoring the dynamics of care needs in the older population, timely delivery of high-quality services, fully utilizing the power of modern caregiving technology, and promotion of healthy aging all contribute to a well-developed and sustainable long-term care system. Policies that protect the health and wellbeing of formal and informal caregivers also play an essential role. At the heart of this issue is the need for a governance model that facilitates communication and encourages collaboration between different stakeholders.

Author contributions

BH drafted the first version of the editorial. RR, RW, and YR drafted, edited, and revised the editorial. All authors contributed to and approved the submission of the editorial.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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COVID-19 and the Elderlies: How Safe Are Hong Kong's Care Homes?

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INTRODUCTION

Even after innumerous advancements in technology and an increase in the average life-expectancy of the humans, the world remained underprepared to deal with the pandemic. This is particularly true in light of the continuing COVID-19 pandemic, which challenged the healthcare system with one of its most critical opportunities to examine its preparedness to deal with the crushing strain of such emergencies around the world in current history. And, as was to be anticipated, the majority of the countries failed their citizens, emphasizing the need to update and re-evaluate the existing policies and infrastructure in the healthcare industry.

The older adults and children were disproportionately affected by the pandemic and were classed as a high-risk group for the disease (1), based on evidence that it targeted the population unequally. This highlighted the significance of having stronger guidelines in place for the vulnerable, who require extra attention, particularly during times of crisis. The ongoing pandemic highlighted in numbers that a high proportions of the death due to COVID were registered amongst the older adults in the USA, Canada, and in European Union states (2, 3).

CASE OF HONG KONG: CITY—COVID—IT'S ELDERLIES

City

Hong Kong, a special administrative region of China, is bordered by mainland China. It has a population of over 7.58 million and the seventh busiest airport in the world, with over 70 million passengers per year. Hong Kong has also one of the world's highest population densities (6887.95/km^2) (4). All of these factors make Hong Kong particularly vulnerable to the coronavirus disease 2019 (COVID-19) pandemic (5). Yet, unlike the rest of the economies that have been contending with the pandemic since early 2020, Hong Kong has been able to keep itself safe for a long time owing to the strict and timely border restrictions, quarantine measures and a loyal citizenry that has dealt with SARS before.

COVID

The authorities' "dynamic-zero" approach, which appeared to be working for over 2 years, is now facing its toughest test with an unprecedented surge in the number of infected cases as the fifth wave hits, which began in early 2022 and is rapidly spreading after the Chinese Lunar New Year celebrations- a traditional time primarily for family gatherings (6). For the region, the "living with COVID" strategy that has been adopted by the majority of countries was never an option. Instead, the responsible authorities chose to adhere to the ambitious "net-zero COVID" policy, also adopted by mainland China, which focuses on maintaining zero cases or taking absolute steps to eliminate the possibility of any infected cases

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in order to keep its people safe and maintain normal activities. This strategy of elimination worked successfully for nearly 2 years following the virus's emergence in Hong Kong (January, 2020), but recently the number of infected cases has skyrocketed, indicating a different dire situation (6). While it took over 2 years and four waves to surpass the 12,000 confirmed cases mark, it has multiplied more than thirty-five times in <2 months in the most recent fifth wave, which is on track to surpass 500,000 confirmed cases and beyond, with 440,609 instances reported on 05 March 2022, with over 200 related death per day being registered (7).

Elderlies

The biggest fear within the loop of actions taken so far is, first, the lowest inoculation rate in the older population of Hong Kong (7), which is ranked amongst the lowest in the list of developed cities index and secondly, the condition of the highly dense packed vertical lifestyle. The intersection of these two critical components has the potential to create the worst-case catastrophe in the coming days. The unique situation, specially owing to its urban typology will make it difficult to either stress on any one of the strategies of "zero COVID" or "living with COVID," rather a very local context specific solution needs to be figured out and very soon at that to mitigate the soaring numbers of the infected cases (8, 9). As the world gets older, demand for services that cater to this segment of the baby boomer population is increasing, and this trend will continue in the future years. Among these are elderly care homes, day care centers, and other institutions such as nursing homes, which provide residential care, meals, personal care, regular basic medical and nursing care, and social support to the majority of the older people in Hong Kong and throughout the world (10).

THE QUANDARY

Hong Kong's average living space per capita is approximately 160 square feet. It is 130 square feet in public rental homes—still significantly larger than the 48 square feet in subdivided flats. It is, however, minuscule in comparison to other countries or cities (Refer **Figure 1**) (11). Adding to this, as the silver population is on the rise with one of the highest life expectancies in the world, the Census and Statistics Department expects over 30% of the population to be above 65 by 2041 (4). At the moment, when the majority of elders with suitable financial means prefer to live in care homes, the epidemic entails the greatest paradox of confined places and increased transmission potential.

Given this scenario, the majority of families who live in a cramped micro apartment may face the most difficulty in self-isolating without the risk of future viral transmission within the family. The current spike has strained the healthcare system, and the following policy revisions propose that moderate or asymptomatic cases need not be admitted to the quarantine centers or hospitals in order to save beds for severe cases (12). In such a case, the elderly care homes in Hong Kong, which often have open floor plans and most of their bed arrangements on a single floor, constitute a significant concern due to the lack of any spatial considerations that would prevent cross-contamination. Numerous studies to date demonstrate that the Omicron variant is significantly more contagious than the preceding ones, despite the reduced fatality rates (13). This might indicate that the virus, which is already more dangerous for seniors due to its high (aerial) transmissibility, along with unfavorable capacity planning and low inoculation rates, could spark a breakout within the care homes and further add to the crisis.

THE COVID-19 POLICY ROAD MAP

As observed in the past four waves, the strict adherence to the "net-zero COVID" policy resulted in one of the lowest infected and death rates in the world for almost 2 straight years while the rest of the world faced the severity of the pandemic. The policy was widely applauded for dealing with the successful containment until the fifth wave hit the city. While the net-zero policy maintained lower number of cases following rapid response, which may include extensive testing and contact tracing, local lockdowns, and travel restrictions, it also created a false assurance for the senior citizens to not get vaccinated over the span that resulted in one of the lowest inoculation rates amongst this section while the counter mega cities like Singapore and other economies had steadily progressed with vaccinating its older adults to prevent what is currently, in the fifth wave is haunting the Hong Kong older population with highest fatality rate in the world at the moment. Previously, while the city was well-insulated from the virus, identifying a single case in a care home required transferring the infected to be admitted in the hospital and all other residents in close contact to quarantine facilities and isolating them for at least 14 days to avoid adding to the number of cases through cross-contamination. The Department of Health overlooked the necessity to urge the older people to be vaccinated during a reasonable timeframe or create alternate emergency disaster prevention planning in case of widespread situation like the ongoing wave. The vaccination rate for 65 and older was looming just over 40 percent while the percentage for the 80 years and above were <20 percent just before the fifth wave. However, in the present situation, with the cases spiraling, the older people are facing the greatest difficulties, as quarantine facilities have reached capacity and hospital beds have exceeded the 90% bed occupancy threshold.

Several older people, among the reported 12,000 people who were waiting to be admitted to the facilities, were left on the streets in the open due to a lack of hospital beds and were not permitted to enter care homes either for fear of disease transmission on February 18 (6). This inhuman situation is absolutely inexcusable. On February 19, the government announced that arrangements have been made to incorporate newly constructed public housing estates, hostels, and sports centers into quarantine spaces capable of housing up to 20,000 additional COVID patients, but these will also become largely redundant if the current rapid transmission rates are not controlled (14).

Since the zero COVID policy works best when the number of infected cases is limited, as has been demonstrated in Hong Kong over the last 2 years, the current scenario with a high number of infected cases is having a direct impact on the older population,

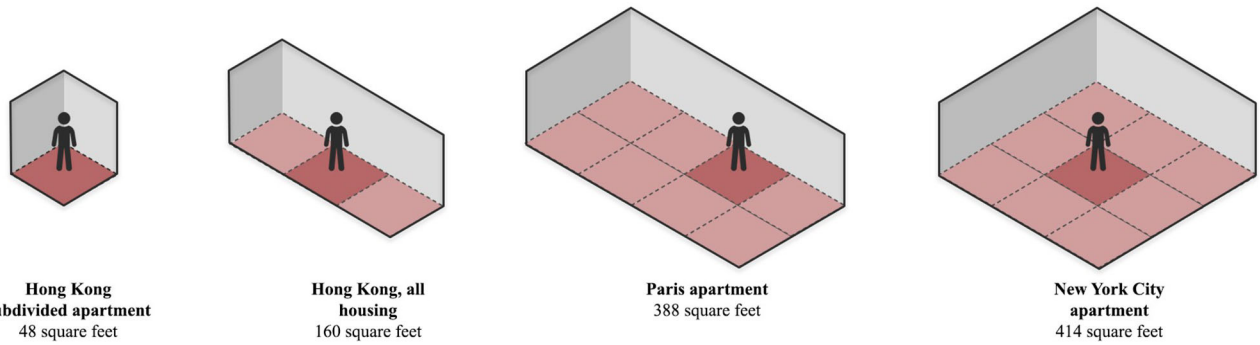

FIGURE 1 | Average living space per person around different cities.

who are the most at risk of contracting the virus. At the moment, with over 50,000 cases reported daily in the first 3 days of March, authorities are pushed to reconfigure their isolation strategies due to the large influx of positive cases and shortage of quarantine spaces. This clearly highlights that more focus is needed toward the better facilitation of the existing living arrangements than staging temporary solutions which can never contain such immense numbers during any given outbreaks of this scale. So far, the pandemic's fifth wave has hit 755 elderly homes. COVID-19 infections have been confirmed in 72 percent of the city's elderly homes, affecting 9,800 people, or 13 percent of its total residents. Staff personnel have also been infected at a rate of 9.5 percent. At least 680 people died as a result of their infections. To get a sense of the severity on a single day, Larry Lee Lap-yee, the Hospital Authority's chief manager for integrated clinical services, reported 136 deaths on March 4th (15). There were 76 men and 60 women among the deceased, ranging in age from 29 to 102. There were 131 senior individuals aged 65 and up among them (96 percent of the total fatalities), with 73 living in elderly homes (53 percent of the total fatalities). Only 17 of them received two doses of the COVID-19 vaccination, while the remaining 21 received only one dose. The rest of the group were not vaccinated.

According to the Center for Health Protection, more than 90% of those who died in the fifth wave did not receive two doses of vaccines. While the lowest inoculation rates among the older people in Hong Kong contributed largely for such high fatality rates. However, it is critical to consider how the city's highly dense structure aided in the rapid transmission, as evidenced by the rapid spread from 40 reported COVID-19 infected care homes on February 20 (6, 7) to a whopping 755 care homes registered in a 2-week interval on March 4 (15). With the primary objective of containing the outbreak with the least possible damage, Hong Kong's policy has shifted from "net-zero" to "dynamic-zero," to currently focusing on reducing the number of infected cases and admitting only cases exhibiting serious symptoms to public hospitals to support the overburdened medical service systems.

According to the recent press release on March 09 (16), the government will add community isolation and respite facilities as part of its efforts to increase support for older people afflicted with COVID-19. All elderly care home patients must now be inoculated (at least the first dose) by March 18th, according to the recent mandate. The authorities will take the lead in implementing closed-loop management in residential care homes that have not yet had an infection case, as well as providing dedicated hotels and vehicles for staff caring for the elderly, in order to prevent them from contracting the novel coronavirus after returning home or entering the community.

CONCLUSION

The pandemic situation, which had been under control and almost dormant in Hong Kong for the past 2 years, is now wreaking havoc and putting a tremendous strain on the healthcare system. The variant Omicron, which predominates in the fifth wave in Hong Kong, has adversely impacted children and the older population (9). As observed in Hong Kong's poorest district, Sham Shui Po, it was one of the first districts to be affected by COVID-19 since the first outbreak (7, 17) and quickly became the hotspot with one of the highest number of cases in the city due to its ultra-dense morphology, which included the presence of mostly poor migrants and low-income workers (18, 19) living in sub-divided flats with poor hygiene, amongst other factors. The older population in Hong Kong, which is already vulnerable, is at an even greater risk because they are disproportionately vaccinated against the virus, which could otherwise serve as a shield. This makes elderly care homes a potential disaster zones in the city, due to the poorly designed indoor environments with inadequate ventilation, cramped spaces, and design that is not resistant to such outbreaks, which house several older people who generally lack the physical strength to fight back against the disease.

This is an essential reminder, in my opinion, that these facilities need to be updated with new design frameworks that considers every aspect, including lessons learned from the

ongoing pandemic, and help to turn them into positive rather than unfavorable spaces. Fundamental reforms to health care systems, antiquated regulations, and the built environment are necessary and must be implemented. The current situation quite strongly highlights the shortcomings of the care homes in effectively dealing with the outbreak, as exposed in the fifth wave with no possibilities to accommodate additional cases for isolation and avoid cross contamination at the same time in the care homes and it is imperative that we learn from this and take necessary actions to better prepare for similar disasters in the future. It is a global challenge and allocating resources to future-proof our cities is critical, as the number of pandemics, epidemics, and natural disasters is likely to increase in the coming years as a result of human interference and climate change. A more "place-based" or territorially responsive strategy to pandemic preparedness is required at this time, given the challenges the government is facing in maintaining the zero-COVID policy. Further in-depth follow-up analysis can be carried out to provide more evidence to validate the outlines that have been emphasized.

In a densely urbanized metropolis like Hong Kong, the interrelationship between the built environment, urban population density, and overall public health outcomes during emergencies such as the COVID-19 pandemic offers significant opportunities for research and development. It will require an interdisciplinary approach to developing evidence-based new models of disaster management and policies, involving expert opinions from policymakers, urban planners, health practitioners, social designers, and architects, among others, because the challenges are wicked and highly entangled.

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The author confirms being the sole contributor of this work and has approved it for publication.

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Will the Policy Instruments Mix Promote the Facility Input of Care Institutions for Older People in China?

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Promoting the facility input of care institutions for older people is the key to the development of the care for older people. With a steady increase in the proportion of older people in China, institutional care services are considered as an important tool for older people. Policies such as government bed subsidies and tax incentives are accelerating the development of institutional care services. However, when the care for older people related policy instrument mixes lacks overall comprehensiveness, consistency and balance, the policy instrument mixes may become a "policy mess", in turn, affecting the development of care institutions for older people. Studies focusing on the combined effects of different characteristics of a policy instrument mix are scarce. To understand how to better use the policy mix to facilitate the care for older people, it is necessary to analyze the characteristics of care policies for older people and its role in the construction of care institutions for older people. Therefore, this study analyzes the impacts of comprehensiveness, consistency, and balance of policy instruments on the facility input of care institutions for older people. An empirical analysis of related policies from 2011 to 2019 in China shows that a synergetic effect exists between the policy instrument mix and the facility input of care institutions for older people. This study points that the comprehensiveness and consistency of the policy instrument mix positively affect the facility input of care institutions for older people, while the impact of balance is not significant. It not only provides feasible policy suggestions for China's policy-making departments to optimize the care for older people related policies, but also helps care institutions for older people further understand the characteristics of policy portfolios and realize sustainable development.

Keywords: care institutions for older people, facility input, policy support, policy instrument mix, comprehensiveness, consistency, balance

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INTRODUCTION

As of November 2020, China recorded 264.02 million people aged over 60, accounting for 18.7% of the total population, and 190.64 million people aged over 65, representing 13.5% of the overall population. Care for older people has become a significant issue affecting social development in China (1, 2). With a decline in the birth rate and family care functions, community care and

home care have failed to provide older people high-quality care services. Therefore, institutional care has become an irreplaceable "support" status in care for older people models with the rapid increase in demand for care for older people in the coming decades (3, 4). Institutional care for older people refers to public and private care institutions that provide places for care services for older people, including nursing homes and elderly apartments. The staff at care institutions for older people provides all-day accommodation and care services for older people. The government, charity institutions, or families bear the expenses of care services for older people.

Promoting the facility input of care institutions for older people is of great significance to meet the needs and services of older people, better promote the development of care service, and ultimately solve the problem about care for older people. According to the evaluation index system of the "Thirteenth Five-Year Plan for the Development of National Aging and the Construction of the Older People Care System" the facility input of care institutions for older people is mainly measured by indicators such as the number of older people care beds and nursing beds operated by the government. Therefore, in our study, we use the number of older people's care beds to reflect the facility input of care institutions. By 2019, the number of institutional care beds for older people has reached 4.385 million in China, but it is still unable to meet the needs of older people. However, the construction of care institutions for older people has the characteristics of high capital investment and a long payback period (5), which directly results in a severe shortage of social care for older people facility input (6). Consequently, the public has low confidence in investing in the care industry for older people, and firm's responses to provide facility of care institutions for older people may not get momentum, if there is no support of policymakers (7).

Given that relying solely on the market is far from satisfying the demand of care for older people in China, the government has promulgated many crucial policies to help promote the development of care institutions for older people. Policymakers can contribute to stimulating firms' willingness to invest through issuing related policies. Therefore, multiple policy instruments can be combined, which can be called a "policy instrument mix" (8, 9). Policy instrument mix is the combination of different policy instruments that belong to the same policy area (7). Chinese government has promulgated many policies to promote the development of care industry for older people. For example, in December 2016, with the growth of the care service market for older people, an increasing number of policy instruments have been created and applied, and the effectiveness of policy instruments has become increasingly significant. The institutional care service system has become comprehensive, and service quality has improved significantly. In 2019, the "Opinions of the General Office of the State Council on Promoting the Development of Elderly Care Services" further indicated that the administrative approval process should be simplified; social organizations should be encouraged to participate in the construction and operation of care institutions for older people; the development of care institutions for older people should be accelerated.

Among these policies, many policy instruments, such as fiscal and taxation, construction standards, approval standards, and fire safety, are combined to help promote the development of care institutions for older people. The mix of policy instruments promulgated by the government is critical to the development of care institutions for older people. However, with the steady growth in care service policies for older people and the increase in policy promulgators and joint departments, policies supporting for the care of older people have gradually shown the characteristics of policy crowdedness, poor policy convergence, and chaotic standards (10). Indeed, when the mix of instruments lack overall comprehensiveness, consistency and balance, the policy instrument mixes may become a "policy mess" (7, 9, 11).

The complex policy mix leads to issues such as unbalanced facility input as bed numbers provided by care institutions for older people and a mismatch between supply and demand, hindering the development of the care service industry for older people. Recently, scholars have recognized the importance of a policy instrument mix on firms' strategies (7) and called for more research to investigate the influence of policy instrument mix (9, 12). However, the evidence of such research which aims at studying the effectiveness of different characteristics among policy instrument mix is very limited (13). Therefore, it is imperative to analyze the impact of the characteristics of elderly care policy instruments on elderly care, to develop policies supporting for the development of institutional care for older people. However, such kind of literature on this topic is scarce (14). To the best of our knowledge, very few studies have investigated the effects of comprehensiveness, consistency, and balance of the policy instrument mix on the facility input of care institutions for older people.

This study seeks to investigate the existing issues within the policy instrument mix, provide suggestions for the government to revamp relevant policies, and guide care institutions for older people to make facility input decisions, to improve the utilization and accessibility of institutional care facilities. From the perspective of institutional elderly care policy instruments, based on elderly care service policies issued by the State Council and various ministries and commissions of the State Council between 2011 and 2019, our study investigated the impact of the characteristics of the policy instrument mix on the facility input of care institutions for older people. First, from the perspective of policy instrument mix, this study categorizes elderly care service policy instruments into three types: supply-based, demand-based, and environmental-based. Furthermore, it calculates the comprehensiveness, consistency, and balance of the policy instrument mix to characterize the interrelationships between policies. Subsequently, it builds a model to analyze the impact of the characteristics of the policy instrument mix on the facility input of care institutions for older people. Finally, according to the empirical results, it recommends feasible suggestions for optimizing the relevant policy design of institutional care from different policy instrument mix perspectives, the application of policy instruments, and other aspects. The policy instrument mix plays an important role in the development of care institutions for older people by analyzing how the characteristics of elderly care policy instruments affect institutional care facilities. It not

only provides feasible policy suggestions for China's policy-making departments to optimize the resource investment of care institutions for older people, but also helps these institutions further understand the characteristics of policy portfolios and realize sustainable development.

LITERATURE AND THEORY

Policy Instrument Mix of Care Institutions for Older People

The phrase "policy mix" emerged and gained popularity in the economic policy literature from the 1960s to the early 1990s. It has been extended to other areas of public policy to explore the interaction between different policy instruments to achieve a specific goal or outcome (15). In a shift from a single policy, there are interactions among multiple policies included in the policy mix (14), which will produce deeper and differentiated policy outcomes. Some scholars have pointed out that policy mix refers to a combination of different policy instruments, and the interactive relationship between policy instruments is the basis of the policy combination (16). Accordingly, studies focusing solely on the interaction of instruments should, specifically, refer to the term "instrument mix" (17). Therefore, a policy instrument mix is a combination of policy indicators that interact with each other (18). Similarly, an care for older people policy instrument mix is a composite set of policy instruments that interact with each other, mainly including construction standards, service requirements, and resource input.

As for the classification of policy instruments, Bemelmans suggested that policy instruments can be divided into regulatory, economic, financial, and soft instruments (19). Howlett and Ramesh categorized policy instruments into four types: mandatory, market, information transmission, and voluntary (20). Chen believed that policy instruments included market instruments, business technologies, and social measures (21). However, in the field of elderly care services, most scholars categorize policy instruments into environmental, supply-based, and demand-based policies (22). Yue divided the integrated care policy for older people into supply-side, demand-side, and environmental policy instruments, and found that environmental policy instruments are the most frequently used, supply-side policies are preferred, while demand-side policy instruments are relatively inadequate (23). Xiu found that China's local care policies for older people can be classified into supply, demand, and environmental policy instruments (24). Mature regions use more environmental policy instruments, which can help stimulate care institutions for older people to provide better care for older people.

Policy instruments are practical means and methods adopted by decision-makers to achieve policy goals. This study adopted the policy instrument model of Rothwell and Zegveld (22). This model weakens the mandatory characteristics of policy instruments, and has a clear market orientation, in line with the current development direction of institutional elderly care services. Based on this model, we constructed the analysis framework as "policy instruments and facility input of care institutions for older people." Care-related policy instruments for older people are divided into demand-based, supply-based, and environmental policy instruments. Demand-based policy instruments reflect the influence of policies on the development of institutional care services and reduce market barriers through government procurement, service outsourcing, market shaping, and international exchanges. Supply-based policy instruments are manifested as the driving force of policies for the development of care for older people and help the supply-side reform of elderly care services through capital, technology, and facility investments. Environmental policy instruments reflect the guiding role of policies for the development of institutional care services, mainly through tax incentives, administrative supervision, and other economic policies, to create an appropriate environment for guiding the development of care for older people. In addition, through the text analysis of the policies we collected, interactive comparisons and the discussion among our group members, we classified the content and key words corresponding to each policy instruments category. The specific institutional care policy classification is shown in **Table 1**.

TABLE 1 | Classification and content description of policy instruments.

Types of policy instruments	Content	Key words
Demand-based policy instruments	Government Procurement	Government purchasing services
	Service outsource	Social capital
	Market shaping	Market cultivation
	International exchange	Global cooperation
Supply-based policy instruments	Talent development	Education training
	Capital investment	Funding
	Technology investment	Technology R & D
	Facility investment	Supporting facilities
	Information service	Information platform
Environmental policy instruments	Tax incentives	Tax deduction
	Technical Support	Industry-University-Research Cooperation
	Land Policy	Land security
	Administrative measures	Simplify the approval process
	Other economic policies	Water and electricity fee reduction

Impact of Policy Instrument Mix on Care Services for Older People

As part of its policy tasks and strategies, the government has attempted to establish a care framework for older people, aiming to promote social forces as market players, open up the care service market for older people, improve the consumption capacity of both households and individuals, and improve service quality. From the perspective of policy instrument mix, investigating the effect of the characteristics of the policies

issued by the government on the development, management, and supervision of the elderly care industry is helpful to analyze each developing stage of care service for older people and to understand the key points of care institutions for older people in each growth period.

Policy instrument mixes offer a new perspective for understanding local care policies for older people. They are used by policymakers to achieve policy goals. The policy instruments that can support elderly care policy refer to the ways to realizing an effective and fair supply of care services for older people (24). In the field of care services for older people, most scholars concerned about the impact of a single policy such as tax policy and subsidy policy on elderly care services. Kim found that the subsidy policy promoted equity of access to public long-term care services, and the subsidized users were more likely to choose institutionalized care (25). Song theoretically verified the importance of subsidy policies in stimulating the private supply of care for older people (7). Kpessa found that three public policies—pension policy for retirement income security, exemptions granted to older people under the national health insurance scheme, and the cash transfer program meant for poverty alleviation—could improve the quality of care services for older people (26). Zhang indicated that long-term care policy, as an outcome of policy transfer, served as a rational tool to determine China's aging problems (27).

The selection of elderly care policy instruments should correspond to the elderly care service system and adapt to the overall goal of the elderly care service system. Policy instruments are used by governmental organizations as tools to influence firms' strategic choices (8). In this study, care service policy instruments for older people are categorized into environmental, supply-based, and demand-based policy instruments. Considering the existing interaction effects between policy instruments, the policy instrument mix has its own characteristics, such as comprehensiveness, consistency, and balance (22).

The comprehensiveness of the care policy instrument mix for older people refers to the range of the application of elderly care-related policies (19). Comprehensiveness measures the diversity of policy tools and policy objectives. The stronger the comprehensiveness is, the more types of care policy instruments for older people involved in stimulating the facility input of care institutions for older people. The comprehensive use of policy instruments can promote the effectiveness of the elderly care system and address potential problems in the system. In addition, the adoption of a wide range of care policies for older people can provide an appropriate environment for the development of the industry and more effectively activate the enthusiasm of care institutions for older people to introduce additional facilities (12).

The consistency of the care for older people policy instrument mix measures the synergy between policies within the policy portfolio and reflects the differences between policies (17). The policy portfolio with high consistency has less conflict among policies and even has a certain synergy. The consistency and coordination between policies can provide a favorable institutional environment for care institutions for older people and effectively promote the development of care services for older people. Individual policy "fighting alone" has a limited impact on promoting the development of the care for older people industry (11). Therefore, the government often promulgates a variety of policy tools or policy objectives to realize the combination linkage between different policies through coordinated allocation, to make the policy combinations more effective. The coordination and consistency between policies in the policy portfolio can increase the effectiveness of policies to a greater extent and promote the effectiveness and accessibility of care-related policies for older people (15). Increasing the consistency of the policy instrument mix will strengthen elderly care institutions' confidence in committing more resources.

The balance of care policy instrument mix for older people measures the balance of the content focus and application frequency of policy tools under different policy mix (17). For example, the content focus of older people care policy instruments include tax policy, financial policy, land policy and other policy, equilibriums among these content focus reflect the balance of care policy instrument mix. A balanced policy mix may help form a more reliable and stable policy framework (9), and subsequently promote the facility input of care institutions for older people, while an unbalanced policy instrument mix may reduce the expectation of care institutions for older people for the market and reduce the facility input. The imbalanced use of policy instruments such as the economic policy, platform construction and social organization cultivation, will greatly limit the formation of the care for older people service market and inhibit the supply of care for older people service resources. If the balance of care for older people policy instrument mix can be enhanced, the facility input of care institutions for older people are promoted. In conclusion, the following assumptions were made.

Based on the above analysis, this study advances the following hypotheses.

Hypothesis 1: The comprehensiveness, consistency, and balance of the policy instrument mix promote the facility input of care institutions for older people.

Hypothesis 2: The comprehensiveness, consistency, and balance of demand-based policy instrument mix promote the facility input of care institutions for older people.

Hypothesis 3: The comprehensiveness, consistency, and balance of supply-based policy instrument mix promote the facility input of care institutions for older people.

Hypothesis 4: The comprehensiveness, consistency, and balance of environmental policy instrument mix promote the facility input of care institutions for older people.

POLICY INSTRUMENT MIX

Policy Quantification and Calculation

This study investigates the comprehensiveness, consistency, and balance of China's care policy instruments for older people from the perspective of the interaction between policy instruments and the interrelationship between policies.

First, we analyzed the effectiveness of the policy instrument mix. Thereafter, we accumulated the scores of a certain indicator

among the various policy instruments of the newly promulgated policies each year, and obtained the total score (TS) of all indicators of a certain care for older people policy.

$$TS_t = \sum_{j=1}^{N} PG_{tj} \times P_{tj} \quad (1)$$

Where j represents the policy; N is the total number of policies in year t; PG represents the score of a certain index; the value of PG changes according to different evaluation criteria and different research contents. We here followed the existing literature and defined PG as 1, which means that all indicators share the same level importance (28). P reflects the effectiveness of the policies, ranging from 1 to 5. The specific measurement standards are that five points represent promulgated laws by the National People's Congress and its standing committee. Four points represent regulations and orders of various ministries and commissions promulgated by the State Council. Three points illustrate interim regulations, opinions, methods, and decisions promulgated by the State Council; regulations of various ministries and commissions; and regulations promulgated by provincial administrative units. Two points denote temporary regulations, methods, opinions, and plans of various ministries and commissions; opinions and regulations promulgated by various provincial administrative units. One point typifies notices and announcements.

We here took a very commonly used measure to calculate policy quantification (12, 22, 23). Based on the calculation of TS, the comprehensiveness, consistency, and balance of different policy instrument mixes within the same dimension and different policy indicator mixes within the same policy were measured.

Comprehensiveness refers to the range of the policy applications. Multiple policy measures must be applied simultaneously in the development of care services for older people. It was obtained by calculating the cumulative sum of the indicator scores of the different policy instruments.

$$COM = \sum_{r=1}^{l} TS_t^r \quad (2)$$

Where, COM represents comprehensiveness; r represents the indicator within the policy instrument; l is the total number of indicators within the policy instruments.

Consistency implies that there are fewer conflicts between different policy instrument mixes. This study used the method of calculating the cosine of the vector angle to reflect the consistency of the policy instrument mix.

$$CON = \left(\sum_{r=1}^{l} TS\right) \times \frac{\sum_{i=1}^{k}\sum_{j=1}^{k} \cos(X_t^i, X_t^j)}{N \times (N-1)/2} \quad (3)$$

$$\cos(X_t^i, X_t^j) = \frac{\sum_{r=1}^{l} (x_t^{ir} \times x_t^{jr})}{\sqrt{\sum_{r=1}^{l} (x_t^{ir})^2} * \sqrt{\sum_{r=1}^{l} (x_t^{jr})^2}}, \forall i \neq j \quad (4)$$

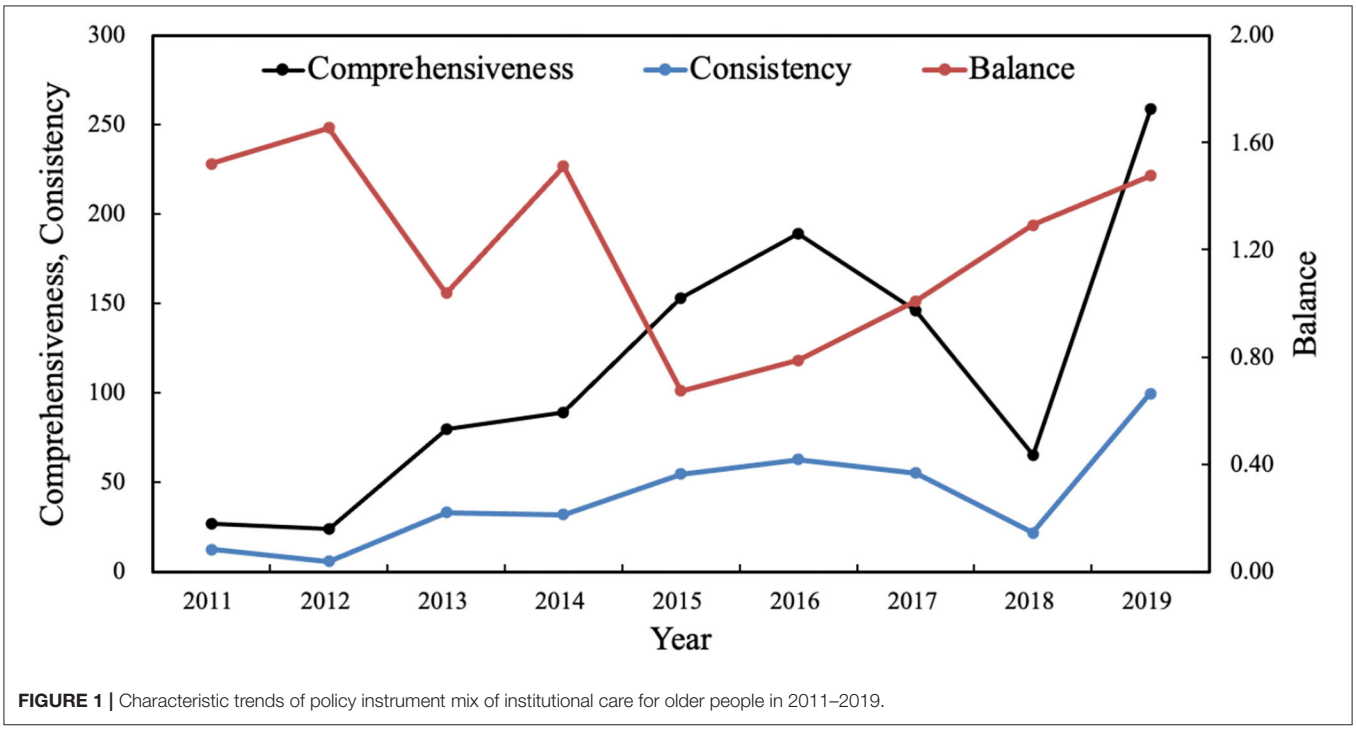


FIGURE 1 | Characteristic trends of policy instrument mix of institutional care for older people in 2011–2019.

Where, *CON* represents consistency; *i* and *j* are any two policies promulgated in year *t*; the instrument indicator vector of a certain policy is $X_t^i = (x_t^{i1}, x_t^{i2}, \cdots, x_t^{il})$; $\cos(X_t^i, X_t^j)$ is the vector cosine value of the two policies. The larger the cosine value, the stronger the consistency.

The balance of care for older people policy instrument mix measures the balance of the policy content focus and application frequency of policy tools under different policy mix. Unbalanced indicators hinder the development of care services for older people. Before measuring balance, we first calculated the correlation index between indicators in different policy instruments.

$$RE_t^d = \left[\frac{|TS_{mt} - TS_{nt}|}{\sqrt{TS_{mt} + TS_{nt}}}\right]^{-1}, \forall m \neq n \tag{5}$$

Where *RE* is the correlation coefficient between different policy instrument indicators, *m* and *n* represent different policy instrument indicators; *d* is a combination of two policy instrument indicators.

$$BAL_t = \sqrt{\frac{\sum_{d=1}^{n^*}(RE_t^d - \frac{\sum_{d=1}^{n^*} RE_t^d}{n^*})}{n^*}^{-1}} \tag{6}$$

Where, *BAL* represents balance; represents the total number of pairs of policy indicators.

Data Sources and Calculation Results

Considering the period of high-profile publications and the binding force of policy texts comprehensively, we selected normative policy texts from 2011 to 2019 for the analysis, and used the Peking University Magic Law Database and the official websites of the State Council and various ministries and commissions to search "care for older people," "care services for older people," "care for older people system," "home care," "community care," "combined medical care and care for older people," "smart care," "Internet care," "aging," and other keywords. Overall, 216 national policies related to institutional care for older people were identified. Finally, by analyzing the policy content, 172 institutional care policies were selected for analysis based on the time, effectiveness, revocation, and overlap of the policy.

According to the above formula, the characteristic trend of the institutional care policy instrument mix is finally obtained, as shown in **Figure 1**.

In **Figure 1**, the comprehensiveness and consistency of the policy instrument mix are very close. It shows an increasing trend by year from 2011 to 2016. This demonstrates that China has increased the promulgation of care policies for older people in recent years and attaches importance to care services for older people. In 2017 and 2018, the comprehensiveness and consistency of the care policy instruments for older people declined marginally. This can be attributed to the promulgation of the "Notice of the State Council on Printing and Distributing the National Aging Career Development and Pension System Construction Plan for the 13th Five-Year Plan," which emphasizes the comprehensive coordination of care for older people service. The development of care services for older people has shifted from comprehensive construction to improving quality and efficiency.

Meanwhile, the balance of policy instruments has increased annually from 2015, indicating that demand-based, supply-based, and environmental policies are coordinated with each other, and that the exploration in institutional care services has achieved positive results.

In **Figure 2**, the comprehensiveness and consistency trends are relatively similar, and the demand-based policy index is the smallest. It indicates that China's institutional care services mainly rely on supply-based and preferential policies to drive the development of care services for older people, ignoring the market demand for care services for older people.

The balance of the three policy instrument mixes presents a fluctuating development state. Overall, the balance of the demand-based policy is higher, and that of supply-based policy is the lowest. Although demand-based policy is not the main policy instrument for care services for older people in China, its development is balanced. It indicates that the government and the market have better coordination in the development of care services for older people. The balance of demand-based policy unexpectedly increased in 2018 and 2019, which was mainly related to policies such as the development of smart care and the opening of the care for older people service market.

IMPACT RESULTS

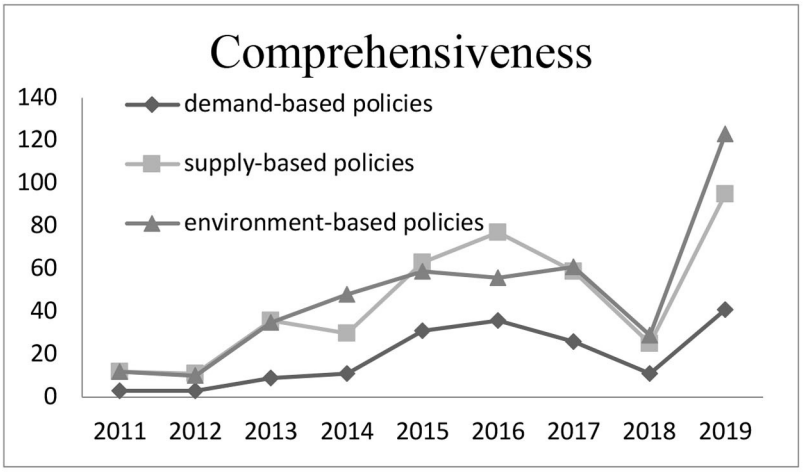
To explore the impact of the policy instrument mix on the facility input of care institutions for older people, this study collected provincial panel data for 2011–2019, using the 2012–2020 China Statistical Yearbook, Local Statistical Yearbook, China Civil Affairs Statistical Yearbook, the 2011–2019 provincial and municipal statistical bulletins, China's economic and social development statistical database, and EPS database.

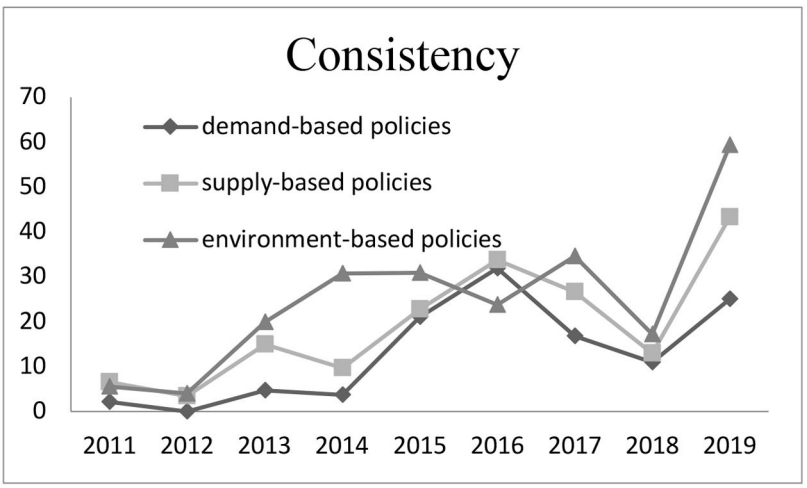
Variables

We considered the facility input of care institutions for older people as the dependent variable. Affected by policies, the state's subsidies to care institutions for older people are mostly bed subsidies; the core asset of care institutions for older people is dependent on the number of beds. Therefore, this study used bed numbers (EB) to measure the facility input of care institutions for older people, following the China Statistical Yearbook, the unit of EB's measurement is ten thousand.

The independent variables included the comprehensiveness, consistency, and balance of the policy instrument mix (PM).

Based on research on the factors affecting the facility input of care institutions for older people, we considered the following control variables: (1) GDP per capita (PG), which measures the social and economic development status. The unit of PG's measurement is yuan. The better the economic development, the more adequate the facility input of care





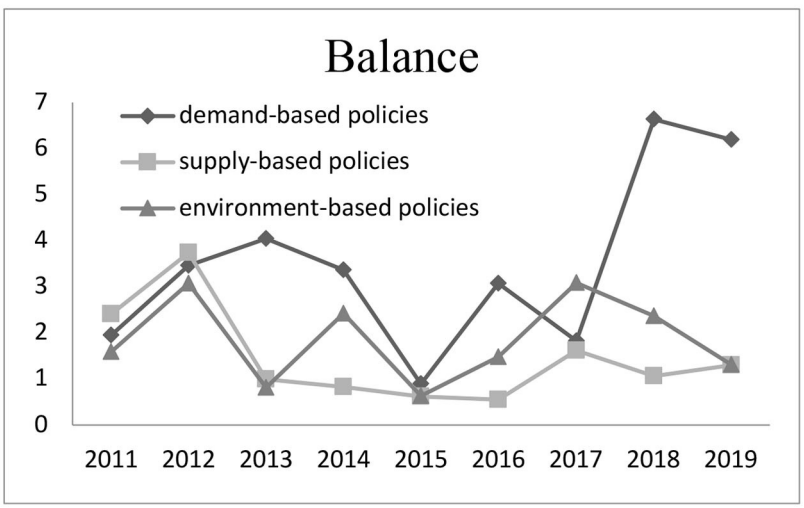


FIGURE 2 | Changes in the characteristics of different policies within the same policy instrument mix from 2011–2019.

TABLE 2 | Descriptive statistical analysis of related variables.

Variables	EB	P G	OR	AE	EL	FI
Number	279	279	279	279	279	279
Average	12.88	54,021.61	13.82	3.11	0.25	17,621.89
Median	10.40	46,674	13.64	2.82	0.24	14,222.22
Max	48.90	164,220	23.82	10.73	0.56	57,466.03
Min	0.10	16,413	6.71	1.43	0.10	516.31
Standard deviation	10.61	26,225.68	3.54	1.22	0.08	12,866.94

institutions for older people. To further eliminate the influence and error of different dimensions between variables, this study employed the logarithmic form of GDP per capita (lnPG). (2) Fixed asset investment (FI): The investment reflects the intensity of investments in social resource construction in various regions. If the investment is higher, more resources are used for the construction of institutions' care services. This study employed the logarithmic form of investment (lnFI). (3) Old-age dependency ratio (OR): If the old-age dependency ratio is high, the demand for facilities for care institutions for older people is higher, so the proportion of social capital invested in care institutions for older people is greater. (4) Pension per capita (AE): This was measured as the ratio of urban employee pension insurance expenditure to the number of urban employee retirees at the end of the year. The higher the average pension per capita, the greater the income and demand that older people can use for institutional care. The unit of AE's measurement is ten thousand yuan. (5) Education level (EL): This was measured by the proportion of ordinary college graduates to the total population. The higher the level of social education, the greater is the willingness to receive social care services for older people. The larger the facility input of care institutions for older people, the more the amount of resource required.

The descriptive statistical analysis of the above variables is shown in **Table 2**.

Based on the calculation results, the comprehensiveness and consistency of the policy instrument mix showed an increase from 2011 to 2016, a decline from 2017 to 2018, and a steady growth from 2019. As for the bed numbers provided by care institutions for older people in China, it increased from 3.534 million in 2011 to 3.788 million in 2016, from 3.836 million in 2017 to 3.795 million in 2018, then increased to 4.385 million in 2019. From the above descriptions, the changing trend between policy mix characteristics and the bed numbers provided by care institutions for older people seems consistent. Therefore, according to the correlation between the facility input of care institutions for older people and the policy instrument mix, in addition, building on the reviewed literature on the related area (9, 12), we employed the following regression model to evaluate the impact of policy mix characteristics on organizations' decisions:

$$EB_{it} = \alpha_0 + \alpha_1 EB_{it-1} + \alpha_2 PM_{it} + \alpha_3 \ln FI_{it} + \alpha_4 \ln PG_{it} + \alpha_5 AE_{it} + \alpha_6 OR_{it} + \alpha_7 EL_{it} + \varepsilon_{it} \quad (7)$$

TABLE 3 | The impact of instrument mix of different policies on the facility input of care institutions for older people.

Independent variables	Comprehensiveness	Consistency	Balance
PM	0.01***	0.02***	−0.06
	(24.39)	(31.20)	(−0.41)
L.EB	0.19***	0.17***	0.19***
	(30.93)	(12.31)	(17.34)
lnFI	−2.25***	−2.59***	−2.83***
	(−3.46)	(−4.76)	(−5.10)
lnPG	1.03	1.51	1.56
	(1.13)	(1.91)	(1.74)
AE	0.43***	0.45***	0.53***
	(6.19)	(13.42)	(6.95)
OR	0.06	0.01	0.15**
	(1.36)	(0.13)	(2.75)
EL	−58.45***	−57.13***	−52.92***
	(−11.42)	(−13.83)	(−13.34)
C	31.30***	30.30***	30.70***
	(4.69)	(4.68)	(5.60)
Wald	2105.67	4453.32	3978.94
	(0.00)	(0.00)	(0.00)
Sargan	24.06	24.28	28.92
(P)	(0.68)	(0.67)	(0.42)
AR1	−2.29	−2.25	−2.34
(P)	(0.02)	(0.02)	(0.02)
AR2	−1.00	−1.13	−1.10
(P)	(0.32)	(0.26)	(0.27)

*T-values are in parentheses. ***Means significant at the 0.1% level, and **means significant at the 1% level.*

Where α_j $(j = 1, 2, 3\ldots)$ is the parameter coefficient; i represents the area; t represents the time, and εitis the model error.

Results

In the case of excluding multicollinearity, considering that there are lags and missing variables of the explained variables in the model, the issues of weak instrumental variables, and potential endogeneity which may result from omitted variables, such as economic development level, financial revenue and expenditure level, this study adopted the system generalized method of moment estimation (SYS-GMM) to calculate the parameter of formula (1). Here, we treated the lag of the facility input of care institutions for older people as instrumental variable. SYS-GMM increases the effectiveness of instrumental variables in the form of zero-filling through complex matrix transformations, and simultaneously estimates the level and difference equations of explanatory variables. It not only overcomes the phenomenon of weak instrumentalization of traditional instrumental variables, but also improves the validity and consistency of the estimated parameters.

The Policy Instrument Mix of Different Types

We considered the comprehensiveness, consistency, and balance of policy instruments as independent variables. The results are shown in **Table 3**.

TABLE 4 | The impact of same-type policy instrument mix on the facility input of care institutions for older people.

	Demand-based policies			Supply-based policies			Environment-based policies		
	Comprehensiveness	Consistency	Balance	Comprehensiveness	Consistency	Balance	Comprehensiveness	Consistency	Balance
PM	0.01***	0.00	0.32***	0.02***	0.05***	−0.08*	0.01***	0.03***	−0.55***
	(8.74)	(0.23)	(19.82)	(34.91)	(30.07)	(−2.12)	(24.24)	(19.39)	(−27.66)
L.EB	0.17***	0.18***	0.15***	0.20***	0.21***	0.17***	0.15***	0.13***	0.15***
	(12.10)	(22.32)	(15.11)	(29.38)	(28.99)	(10.38)	(13.36)	(10.06)	(16.04)
lnFI	−2.60***	−2.84***	−1.75***	−2.45***	−2.41***	−2.72***	−1.98**	−2.91***	−3.77***
	(−4.37)	(−5.59)	(−4.08)	(−3.67)	(−3.99)	(−4.53)	(−2.70)	(−5.42)	(−7.01)
lnPG	1.19	1.69*	−0.29	1.07	1.49	1.42	0.40	1.21	3.08**
	(1.11)	(2.27)	(−0.33)	(1.14)	(1.81)	(1.49)	(0.35)	(0.88)	(3.21)
AE	0.50***	0.47***	0.30**	0.47***	0.37***	0.52***	0.47***	0.50***	0.63***
	(7.36)	(6.14)	(3.27)	(7.11)	(4.20)	(7.41)	(15.87)	(8.90)	(20.23)
OR	0.09	0.13*	0.04	0.07	0.00	0.11*	0.02	0.04	0.13**
	(1.95)	(2.47)	(1.86)	(1.36)	(0.01)	(2.10)	(0.52)	(0.93)	(2.97)
EL	−48.82***	−51.75***	−40.01***	−57.82***	−60.03***	−52.17***	−54.13***	−51.12***	−54.69***
	(−7.92)	(−10.59)	(−9.01)	(−12.95)	(−14.57)	(−12.76)	(−14.25)	(−14.27)	(−16.08)
C	31.36***	28.67***	38.74***	32.60***	28.74***	31.16***	35.84***	35.98***	22.95***
	(5.12)	(5.37)	(6.12)	(5.17)	(3.94)	(5.22)	(4.94)	(3.58)	(3.36)
Wald	1,117.81	3,135.76	14,275.32	2,855.40	3,397.82	2,287.02	8,644.88	5,426.48	5,491.97
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Sargan	27.43	28.51	28.36	25.15	23.92	27.67	23.07	25.99	21.65
(P)	(0.50)	(0.44)	(0.45)	(0.62)	(0.69)	(0.48)	(0.73)	(0.57)	(0.80)
AR1	−2.24	−2.31	−2.39	−2.27	−2.26	−2.31	−2.25	−2.21	−2.2
(P)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)
AR2	−1.13	−1.1	0.53	−0.95	−0.68	−1.16	−1.35	−1.54	−1.72
(P)	(0.26)	(0.27)	(0.60)	(0.34)	(0.50)	(0.25)	(0.18)	(0.12)	(0.09)

*T-values are in parentheses. ***Means significant at the 0.1% level, **means significant at the 1% level, and *means significant at the 5% level.*

The results of the joint test of the parameters show that the parameters of Models 1–5 in **Table 2** are distinctly significant. It indicates that the model setting is reasonable and effective. The results of the Arellano-Bond test show the residuals of all models show a first-order autocorrelation, no second-order autocorrelation at a significance level of 5%, and the non-significant Sargan statistics. It illustrates that the instrumental variables used in each model are all valid.

From the perspective of independent variables, the comprehensiveness and consistency of policy instrument mix of different types have a positive impact on the facility input of care institutions for older people. It indicates that the synergy between policies is enhanced with the number and range of care policies for older people in China, which is conducive to promoting the increase of care institutions. The balance of different types of policy instruments has a negative effect on the facility input of care institutions for older people. This shows that the care for older people service system becomes complete when the indicators of the supply-based, demand-based, and environmental policies are balanced, which can inhibit the blind facility input of care institutions for older people driven by policies.

The Policy Instrument Mix of the Same Type

Taking the comprehensiveness, consistency, and balance of the three policy instruments of demand-based, supply-based, and environment-based policies as independent variables, the results are shown in **Table 4**.

In **Table 4**, the comprehensiveness of demand-based, supply-based, and environmental policies has a positive impact on the facility input of care institutions for older people. It indicates that the higher effectiveness of policy institutions is beneficial to the facility input of care institutions for older people. The consistency of the supply-based and environmental policies has a positive impact on the facility input of care institutions for older people. It suggests that a consistent policy is conducive to the construction and operation of care institutions for older people. The impact of the consistency of the demand-based policy on the facility input of care institutions for older people is not significant. It indicates that the consistency of the internal indicators of the demand-based policy still needs to be improved. The balance between supply-based policy and environmental policy has a negative impact on the facility input of care institutions for older people. It suggests that the balance of the internal indicators of the supply-based and environmental policies can enhance the completeness of the care for older people service system. Rational market supply can inhibit blind investments in care institutions for older people. The balance of demand-based policy has a positive impact on the facility input of care institutions for older people, indicating that the balance of the indicators of demand-based policy gives market supply entities a motivation to invest in institutions' care services.

CONCLUSIONS AND POLICY IMPLICATIONS

Motivated by the increasing challenges facing by care institutions for older people, the study is aimed to explore the impact of policy instrument mixes on the development of care institutions for older people. It categorizes care policies for older people into three kinds of policy instruments: demand-based, supply-based, and environmental. It measures comprehensiveness, consistency, and balance to characterize the interaction of different policies and the relevance of internal indicators. Thus, a model has been constructed to analyze the impact of the policy instrument mix on the facility input of care institutions for older people.

The main conclusions are as follows: First, the comprehensiveness and consistency of the policy instrument mix showed an increase in 2011–2016, a decline in 2017–2018, and a continued increase in 2019. This is consistent with the trend of changes in the number of care for older people beds in institutions, which shows that there is a certain correlation between the policy instrument mix and the facility input of care institutions for older people. Second, the comprehensiveness and consistency of the policy instrument mix have a positive impact on the facility input of care institutions for older people, and the balance has no significant impact on the facility input of care institutions for older people. It suggests that the facility input of care institutions for older people is significantly affected by policies, and a scientific and reasonable policy combination is conducive to the facility input of care institutions for older people. Third, we focus on optimizing the policy instrument mix to scientifically guide the facility input of care institutions for older people. In the future, the design of care policies for older people should improve the comprehensiveness, consistency, and balance of policy objectives, enhance the coordination of policy instruments, and focus on demand-based policies.

This study analyzes the trends and characteristics of the comprehensiveness, consistency, and balance of elderly service policies promulgated by the Chinese government in 2011–2019, and clarifies the relationship between care for older people service policies and the facility input of care institutions for older people. Our study has a great significance for improving the formulation and improvement of care policies for older people.

The study contributes to the literature on care for older people from the view of policy support. Theoretical research on the policy instrument mix in terms of input of care institutions for older people has been paid attention recently (2, 29). However, studies focusing on the combined effects of different characteristics of a policy instrument mix are scarce (9, 30). This study fills this gap by estimating the influence of the comprehensiveness, consistency, and balance within a policy instrument mix on the develop of institutional care for older people.

Our study shows that the design and implementation of care-related policies for older people affect the resource input of care institutions for older people. Therefore, attaching importance to the scientific setting of policy objectives and the effective combination of policy instruments is conducive to the quality of institutional care. In addition, the actual situation should be fully considered in the design and implementation of policy portfolios. We should pay attention to the coordination and cooperation between supply and demand.

Based on our paper's conclusions, the practical implications are as follows. When the government formulates a policy, the regional environment and care for older people demand preferences need to be considered. It can help improve the resource allocation of care services for older people and improve the utilization rate of care for older people resources. Policy instrument mix can affect the supply of resources to a greater extent. However, from the demand part, such as the bed numbers needed by older people, sometimes are less affected by the policy instrument mix. So, to use the resources more efficiently, the government should fully consider the part of demand part when making policies. In addition, policy consistency and convergence should be paid more attention. For example, many older people in Japan are concerned about healthcare expenditures, the health care system, and health policies. This may be driven by frequent health policy changes and uncertainty owing to regular changes in the administration (9). To avoid vicious competition and help care institutions for older people realize sustainable development, the policy issuers should form industry supervision and information exchange mechanisms. Despite our unique insights, like all research, our study has limitations. Through the process of analyzing the policies, the text mining method is inevitably subjective. And the policies we collected are at the national level, the future studies can also further collect and analyze the policies at the provincial and municipal levels.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

FZ and CY: conceptualization. FZ and XD: methodology. XiaodY and FZ: validation. FZ: resources. FZ, CY, and XiaotY: writing. XiaodY and QJ: super vision. All authors have read and agreed to the published version of the manuscript.

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Identifying the Service Capability of Long-Term Care Facilities in China: An e-Delphi Study

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Objective: This study develops a group of service capability indicators for long-term care facilities to assess their current conditions and makes it the first step toward the improvement of service capability in China.

Methods: We constructed an initial indicator framework based on the characteristics of long-term care services and a literature review. Potential indicators were collected, and a 2-round modified web-based Delphi process was conducted by a national multidisciplinary expert panel to construct a service capability evaluation index system. The accepted competencies of indicators were established with mean scores in all three scoring criteria (importance, feasibility, and sensitivity) $\geq$ 4.0, consensus rate reached 70.0%, and a coefficient of variation $\leq$ 0.25.

Results: A new indicator framework covering 2 dimensions of inputs and activities was developed in this study. The initial 35 indicators formed an indicator pool for the Delphi questionnaire. According to the final consensus of the expert panel, the Delphi consultation resulted in an index system comprised 31 tertiary indicators across six subdimensions (i) staffing; (ii) facilities and equipment; (iii) funding; (iv) medical inspection services; (v) health management services; (vi) institutional standard management.

Conclusion: This study developed a set of indicators suitable for the long-term care system in China and is expected to be applied to measure and improve the service capability of long-term care facilities. In addition, these indicators can be used for comparisons between different LTCFs and provide an evidence basis for the further development of capability assessment tools.

Keywords: long-term care facilities, long-term care insurance pilot, service capability, Delphi consultation, index system

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INTRODUCTION

Older adults aged 60 and over accounted for 18.70% of the Chinese population in 2020 (1), and 42 million (15.91%) of them experienced physical limitations. In 2020, the disability rate of the population aged 85 and above reached 34.7%, and the prevalence of chronic diseases displayed the same growth trend (2, 3). It is expected that the physical restrictions that older adults face as a result of progressive diseases and functional deficits will continue to escalate with the aging and increased longevity of the population. Consequently, the need for long-term care (LTC) services among those people are expected to increase dramatically (4). In other words, service improvement

is important and indispensable for older people, which means a well-designed LTC system and effective management along with quality assurance (5, 6). LTC services refer to a variety of services that help meet both the medical and non-medical needs of people who cannot care for themselves over a long period (usually 6 months). In particular, it provides help in activities of daily living (ADLs), such as bathing, dressing, toileting, and walking, and in instrumental activities of daily living (IADLs), such as housekeeping, shopping, preparing meals, and managing money (7). These services may be provided in either institutional settings such as long-term care facilities (LTCFs) or in non-institutional settings such as older adults' homes or communities. Services received from paid caregivers are termed "formal care" (8, 9). Generally, LTCFs provide specialized formal care for older people with higher-level care dependence. This represents an important component of overall senior health or welfare policies and has a significant impact on social development (10, 11).

To meet people's growing demand for multilevel LTC services, China launched a systemic pilot program covering 15 cities (called the long-term care insurance pilot, LTCI pilot) in 2016 that took actions such as carrying out disability grade assessment, developing LTC service packages, and reforming LTC payments (12). The second round of this pilot was launched in 2020, which has covered all provinces in China (each province contains at least one pilot city). The existing pattern of LTC services in China includes community home care and institutional care, among which institutional LTC is aimed at elderly individuals with a higher degree of disability (13). Since the implementation of the pilot program, only the seniors with a disability level 4 and above can apply for services from an LTCI-designated institution. A series of guidelines imposed more stringent requirements for service improvement within LTCFs and led them into intensifying competition. LTCFs have thus been exploring their options concerning the questions of how they can maintain their competitive advantage in the LTC market and how they can develop sustainably.

As a professional service for improving health, LTC services have certain similarities with health services, and extensive research has been carried out in the field of health. In recent years, health service research has not only focused on service quality but also gradually explored the issues of service capabilities. The viewpoint of organizational capability theory is that organizations need to focus on continuous capability building to achieve goals and form long-term competitiveness under the influence of the external environment. In other words, the theory suggests that internal factors (capability) are the leading factors in organizational growth and determine its degree and scope. The basic assumption of organizational capability theory is: in a specific external environment, the improvement of organizational capability will be conducive to the realization of its ultimate goal. As an abstract concept, the mechanism of service capability can be explained as follows: capability does not directly present competitive advantages but embodies the process of resource acquisition, allocation, and utilization through a series of structural or procedural elements, that is, the transformation from input, activity (or process) to output (or result) (14). At present, the research on the capability of health services mainly focuses on the perspective of service personnel, that is, personnel competence. The specific literature includes the core competence of health professionals for specific diseases (15), the ability of medical staff to obtain evidence (16–18), information technology capabilities in hospitals (19), and the subjective competence of nurses (such as empathy capabilities in nursing services) (20). Regardless of the dimension of health service capability research, existing studies generally show that the suitability of service capacity has a key impact on health service quality (or subjective and objective outcomes). The research ideas of health service can provide a reference for the in-depth study of LTC service, but the differences between LTCFs and medical institutions still need to be considered: (1) In addition to focusing on the professionalism of formal LTC services, it is also necessary to consider the nursing environment; (2) Nurses in LTCFs may also play the role of service managers; (3) The elderly lives in LTCFs for a long time, even until death; (4) Demanders have higher requirements for maintaining autonomy and body functions[1].

Based on the research experience in health services, it is necessary to discuss the front-end factors of service outcomes to promote service quality. Therefore, research on LTC service capabilities also requires further attention. The concepts of capability or capability development are so all-encompassing that practitioners have often found it difficult to make operational sense of them. It is important for researchers to begin by asking the question "capability for what?" and focus on the specific capabilities needed to accomplish clearly defined goals. From a general point of view, capabilities describe the functional building blocks that enable service delivery (the "what"). A complete assessment of the capability landscape will take resources, process or other dimensions into consideration. Processes describe how services are implemented. The United Nations Development Programme (UNDP) puts forward that capacity is the ability of environment, organization or individual to achieve corresponding functions, or the power to perform specific functions (21). WHO proposes in LTCFs statistical indicators that facility availability and capacity indicate the ability to provide care to people with dementia and to meet their needs and preferences (22). There is no official or recognized definition of service capability in LTCFs, but existing research on service quality and its influencing factors can provide inspiration for clarifying this topic. A large body of tools are available to evaluate the service quality of LTCFs, including outcome measurement indicators developed by different research teams (23, 24) or nationally unified scale tools (25, 26). Some studies define service quality as a more comprehensive concept, covering environment, resource allocation and other factors (27–29). There is sufficient evidence that staffing (30–34), service process (35, 36), rehabilitation care (37), internal management (38), or training of managers (39) in LTCFs are closely related to service quality. It can be found that although many studies have explored the front-end factors of service quality, they are still discussions on a single dimension. At the same time, the existing literature on LTCF's capability is mostly limited to specific topics, such as

[1]Examining Competencies for the Long-Term Care Workforce: A Status Report and Next Steps.

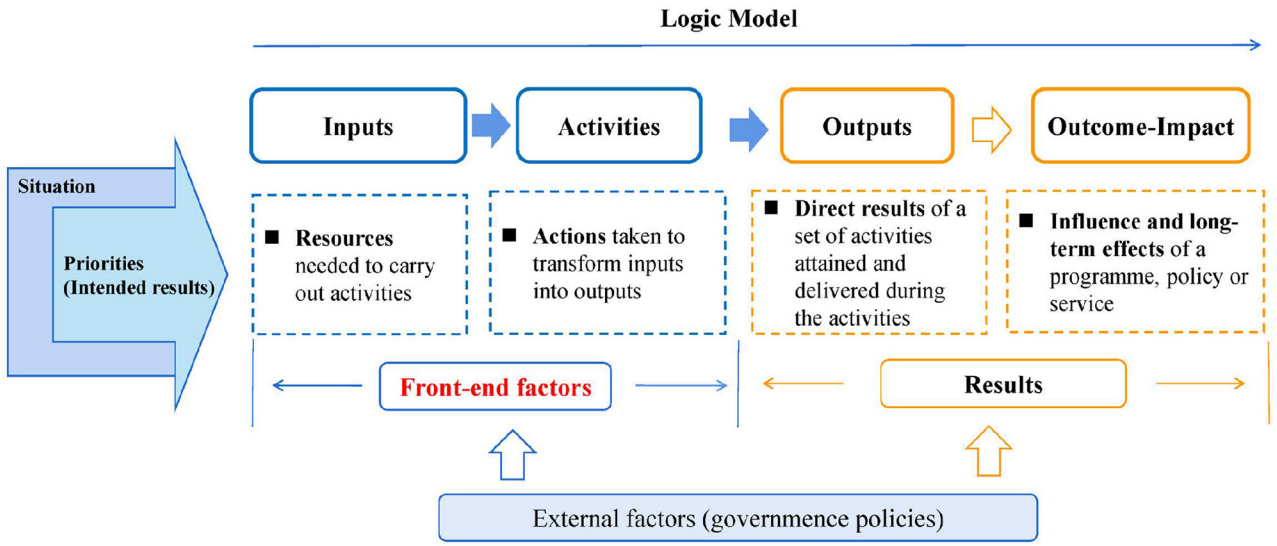

FIGURE 1 | Elements of a results chain.

the competency of LTC personnel[2]. The WHO has developed a competency framework for rehabilitation personnel (40). There is a lack of comprehensive combined and integrated analyses that would allow effective exploration of the heterogeneity of LTCF's service capability.

Therefore, the current study aims to establish a theory-based indicator framework of service capability for LTCFs and systematically develop a set of indicators specifically suitable for China using an interprofessional Delphi process. The paper's intended audience is a broad range of policy makers and practitioners. But it is directed most particularly to those working on continuous improvement of LTC services at the field level. The resulting set of indicators is intended to be applicable tools for measuring the comprehensive service capability of LTCFs, furthermore, to serve as a framework to guide and stimulate ongoing discussions on service improvement in aging societies and LTC settings.

METHODS

Generation of New Indicator Framework and Potential Indicators

The classical results chain framework, also known as "logic models," is often used in indicator development studies. They are diagrams that map out a series of statements that link factors in an "if…then" fashion—for example, if a certain type of service is provided, then a performance of the service organization could be enhanced or if a policy opportunity is taken, then a thematic target might be improved (41). Combined with the existing literature, the inputs are used to carry out activities, these two elements are front-end factors that lead to results, including the services or products delivered (outputs), the immediate change (outcomes), and eventually the long-term impact (42). It is worth noting that this chain should be analyzed in terms of the situation (such as market conditions, policies) and intended results (**Figure 1**). Combining the aforementioned organizational capacity theory and evidence from the literature on quality of service, in the service organization, the front-end factors could be refined into the concept of comprehensive service capability. For the LTCFs, input describes the resource characteristics of service providers, such as the qualification of the nursing staff or the allocation of related equipment. Activities cover the procedures or methods for medical technicians and nursing staff to provide services, which will be reflected in the quality of care (QoC) if properly used (43). We consider that, similar to professional organizations, in addition to service delivery in LTCFs, their internal management of LTCFs also plays an important role in obtaining better service results. The service capability of an LTCF in our study was defined as follows: by adapting to the external environment (policy and LTC market), the LTCF organizes internal resources to manage daily services and administrative work to effectively operate and provide LTC services (44). Based on this, a new indicator framework including inputs and activities is constructed to guide the development of service capability indicators in LTCFs.

Under the guidance of the indicator framework, national practice guidelines were reviewed to extract recommendations in LTC service improvement as candidate indicators, that is, the initial Delphi instrument. A systematic literature search was conducted in electronic databases using the search terms "long-term care," "service capability," "quality of care," and "performance measure," which can help us understand the relevant indicators in other countries. In addition, the added items were identified from an expert panel. Their Chinese

[2]Examining Competencies for the Long-Term Care Workforce: A Status Report and Next Steps.

TABLE 1 | Example of the Delphi questionnaire.

	Indicators	Importance	Feasibility	Sensitivity	Suggestions
Dimension 1	Indicator 1				
	Indicator 2				
	Indicator 3				
	Other indicators that need to be added in this dimension (Please explain the reason in detail):_____				
Dimension 2	Indicator 1				
	Indicator 2				
	Indicator 3				
	Other indicators that need to be added in this dimension (Please explain the reason in detail):_____				

(1) Experts need to rate each indicator in the questionnaire on a 1–5 scale; for example, 1 means the least important, and 5 means the most important. (2) Feasibility represents the availability of the corresponding data for this indicator; 1 means that the data are difficult to obtain, and 5 means that the data are easy to obtain. (3) Sensitivity refers to the extent to which the indicator can influence changes in service capability results. The higher the degree of discrimination, the higher the sensitivity score of the indicator.

versions with detailed definitions were prepared to be discussed in the first round.

Delphi Process

This study used the Delphi method to build a service capability evaluation index system for LTCFs. The e-Delphi technique is an environmentally friendly approach to research that leads to rapid feedback and responses from an expert panel (45). In general terms, this method assumes that the opinion of experts can have a scientific application (46). It consists of a participatory methodology that aims to generate consensus, where the participants building consensus on the subject in question, but without direct confrontation of opinions. To this end, it implies a structured process and a systematic, effective, reliable and comprehensive technique for collecting and distilling knowledge from a group of qualified specialists carefully selected by means of a series of anonymous questionnaires interspersed with controlled feedback. The obtained results, to a large extent, have a multidisciplinary vision and the potential to obtain viable data that allow informing policy makers or other practitioners.

The basic criteria for the selection of experts in our study include (i) expert authority, which means the academic background related to LTC; (ii) a wide range of sources, including scientific researchers and management personnel in LTC-related administrative departments; and (iii) expert qualification, which refers to the professors (or associate professors) with experiences in professional work for more than 8 years.

Round 1- Rating of Indicators

The indicators confirmed in the initial part were formulated into a Delphi questionnaire with a letter introducing the background and the aim of the study as well as detailed instructions of scoring criteria for indicators: importance, feasibility, and sensitivity. The rating scale of each indicator was a five-point Likert scale (**Table 1**). Experts in this study came from a wide range of background expertise and perspectives across different types of organizations. Our interdisciplinary working group are very familiar with domestic LTC-related researches, and has established a database of experts with rich research achievements (mainly from universities/colleges and academic research institutions). Combined with the above principles, 15 candidates in the expert database who met the inclusion criteria of this study were further selected. Potential candidates from pilot cities were recommended by the directors of the Healthcare Security Administration, and five administrative experts were finally selected to participate in the Delphi process. They all had leading positions in their relevant institutions which contributed to the identification of the priority issues during the Delphi process. The questionnaire was distributed by e-mail to the 20 expert panel members, followed by a reminder e-mail 2 weeks later. Modifications, eliminations and combinations were made based on the above considerations, and experts were encouraged to propose new items to existing ones if deemed necessary.

Round 2- Revision and Grading Based on the First Round of Feedback

After the first survey round, SPSS V.23.0 was used to compute the indicator score. The rating result of each indicator was discussed after the round one feedback. In addition, whether the indicator was suitable for the measurement of the service capability of LTCFs in the environment of the LTC system in China was also discussed. The eliminated indicators in Round 1 were reviewed again to decide whether some of them were also important and could be retrieved. The new questionnaire with revised indicators and detailed scores was sent to the expert in round 1 again. Feedback was received 2 weeks later.

Data Analysis

The scientific soundness and rationality of the Delphi method are reflected by three indicators: experts' positive coefficient, authority coefficient, and coordination coefficient.

(1) The experts' positive coefficient reflects the effective response rate to the consultation questionnaire and determines the credibility and scientific basis of the results. Authoritative data show that an effective response rate of 50% is the minimum acceptable value for the Delphi method, 60% is considered moderate, and over 70% meets a very good standard (47).

TABLE 2 | Judgment basis and familiarity with the topics for consultation from experts.

Questions	Evaluation criteria	Your choice
Judgment basis	a. Practical experience (0.4) b. Theoretical analysis (0.3) c. Knowledge from domestic and foreign counterparts (0.2) d. Intuition (0.1)	
Familiarity	a. Very familiar b. More familiar c. Average d. Less familiar e. Unfamiliar	

(2) The expert authority coefficient (Cr) is generally determined by two factors: the judgment coefficient (Ca), which represents the evidence for the expert to make a judgment, and the familiarity coefficient (Cs), which represents the expert's familiarity with the issue (48). As shown in **Table 2**, Ca is calculated in the order of "practical experience" (0.4), "theoretical analysis" (0.3), "knowledge from domestic and foreign counterparts" (0.2), and "intuition" (0.1) (49). The degree of familiarity (Cs) is divided into 5 levels: very familiar (1), more familiar (0.75), average (0.5), less familiar (0.25), and unfamiliar (0). Cr can be calculated by the formula Cr= (Ca + Cs)/2. Generally, a Cr value >0.7 is considered to indicate acceptable reliability.

(3) Coordination coefficient. Kendall's W concordance coefficient test is used to assess the quality of expert consultation and measure the difference in expert opinions on the importance, feasibility and sensitivity of each indicator. That is, the consistency of n experts' scoring results of K indicators at various levels, and the value is 0–1. Statistical significance of Kendall's W test results indicates consensus among experts.

In addition to judging Delphi quality from the above aspects, the calculation methods of each index score in this study include (1) arithmetic means of the score for each indicator; (2) consensus rate (or support rate), that is, the ratio with indicator scores 4 or above; and (3) coefficient of variation (CV), which reflects the fluctuation degree of experts' scores on each indicator. The smaller the CV value is, the more concentrated experts' opinions on this indicator are. The accepted competencies were established with mean scores in all three scoring criteria (importance, feasibility, and sensitivity) $\geq$ 4.0, consensus rate reached 70.0% and a coefficient of variation $\leq$ 0.25.

RESULTS

Basic Information on the Participants

In the first round, a total of 20 consultation questionnaires were issued, and 18 were recovered, with an effective recovery rate of 90%. In the second round, three experts did not give feedback, with an effective recovery rate of 83.33%. **Table 3** presents the profile characteristics of the experts. Based on the findings, 18 experts consented to participate in the study from various areas, including Beijing, Shanghai, Jinan, and Hangzhou. Sixty-one percent (n = 11) of the participants were from educational institutions, and most had more than 20 years of work experience (n = 12, 66.67%). Sixty-one percent of the participants were professors.

TABLE 3 | Profile characteristics of the experts (n = 18).

Characteristics	*N*	%
Age (years)		
≥30	4	22.22
≥40	5	27.78
≥50	9	50.00
Years worked		
≥5	2	
≥10	4	22.22
≥20	5	27.78
≥30	7	38.89
Professional title		
Associate professor	7	38.89
Professor	11	61.11
Workplace		
Medical colleges	11	61.11
Academic research institutions	4	22.22
Governmental institutions	3	16.67

Preliminary Results of Delphi Method

According to the calculation, the Cs score is 0.688, and the Ca score is 0.844. Then the value of the expert authority coefficient Cr could be calculated as (0.688+0.844)/2 = 0.767 (>0.7), indicating that the expert consultation results are accurate and reliable.

Delphi Consulting Results of the Service Capability Evaluation Index System

A total of 35 potential indicators were extracted from the policies and literature, of which 19 were for inputs and 16 were for activities. All these indicators were entered into a Delphi questionnaire to be discussed. In Round 1, 11 indicators did not reach consensus as being "important" or "essential" for inclusion in the core capability framework and were excluded from Round 2. For the indicators recommended by 2 or more experts, they were added in the second round of the questionnaire. If only one expert proposed to add a certain indicator, our research team discussed the indicator and then decided whether to include it in questionnaire 2.0. Based on this principle, an additional 11 indicators were added to the Round 2 questionnaire. In addition, the feedback included the amended wording of four indicators and 2 dimensions. We merged two specific capabilities into 1 under subdimension 2.2 to reduce redundancy (The two indicators of physical examination and physical assessment are combined into one indicator, namely indicator 2.2.1). According to the predefined inclusion criteria, 34 indicators met the criteria and finally entered the second round.

TABLE 4 | Kendall's W for indicators in the Delphi process.

Scoring criteria	Round 1				Round 2			
	W	χ^2	df	*P*	W	χ^2	df	*P*
Importance								
Secondary indicator	0.069	7.398	6	0.286	0.159	11.923	5	0.036
Tertiary indicator	0.204	124.962	34	0.000	0.140	60.002	33	0.003
Feasibility								
Secondary indicator	0.393	42.420	6	0.000	0.348	26.113	5	0.000
Tertiary indicator	0.174	106.776	34	0.000	0.374	160.586	33	0.000
Sensitivity								
Secondary indicator	0.124	13.399	6	0.037	0.150	11.269	5	0.046
Tertiary indicator	0.156	95.347	34	0.000	0.149	59.068	33	0.004

In Round 2, all the indicators that met the predefined criteria remained, and three indicators were eliminated because they were deemed not important and necessary for inputs. After adjusting the indicators according to the first round of opinions, the expert coordination coefficients in the second round were statistically significant in all dimensions ($P < 0.05$), indicating that the opinions of all the experts tend to be consistent (**Table 4**). Compared with the results of the first round, the average importance score of the secondary indicators increased, and the support rate reached 100%. At the same time, the sensitivity scores of these dimensions were improved, and the coefficient of variation was between 0.000 and 0.147, lower than the results of the first round. The scores of importance and availability of the tertiary indicators were all more than 4, and the support rate increased to 73.33–100%. After completing all the procedures of the Delphi approach, the final core capability framework comprised 31 specific indicators mapped to six subdimensions (i) staffing; (ii) facilities and equipment; (iii) funding; (iv) medical inspection services; (v) health management services; (vi) institutional standard management. The first three subdimensions are the key inputs mentioned in the framework. The fourth to sixth subdimensions reflect both the professional services and internal management of LTCTs, which together constitute the activities in the framework. All the selected indicators are shown in **Table 5**.

DISCUSSION

With the progress of aging, the LTCI pilot program marks the beginning of systematic development of the China LTC system, covering 49 pilot cities thus far. As mentioned above, only the seniors with a disability level 4 and above can apply for services from an LTCI-designated institution. How can LTC services be better delivered to improve the health outcomes and physical function of the elderly? It is a major but difficult issue that the current LTC system needs to address. The government departments, research institutions, and many other parties have conducted extensive discussions on this topic. To the best of our knowledge, this is the first study focusing on the development of comprehensive capability indicators for LTCFs in the context of the China LTC system, which should be further tested by similar studies in other countries for its validity.

External regulation and the market environment have an impact on the development of LTCFs, urging these institutions to optimize the management process to provide professional and standardized LTC services, which poses a greater challenge to service capability. Most previous studies developed indicators based on the "input" dimension. In other words, it is considered one-sided and unreliable when equating static resources within the institutions with service capabilities. Alternatively, some studies confuse the evaluation of service results with service capabilities. How to transform the realization of core functions into measurable indicators is a difficult point in research. The service functions and positioning of LTCFs in China are still being explored and discussed, and the evaluation index system should be oriented and operable to identify the general advantages or disadvantages of LTCFs. The framework not only emphasizes the static capabilities presented by resource inputs but also fully embodies the professional service and management process based on the inputs. After two rounds of the Delphi process, we pioneer the new indicator framework of service capability, including 2 dimensions: inputs (staffing, facilities and equipment, funding) and activities (medical inspection services, health management services, institutional standard management). The "activities" is built based on the consideration that the service process and internal management play important roles in service improvement. In general, LTCFs tend to be more compliable to the better use of resources when they have a deep understanding of dynamic capabilities and competitiveness, thus making the process of services more appropriate. Therefore, the evaluation of service capabilities should not only concern the static resource input. In the early days of the development and application of dynamic capability theory, some experts in the medical field put forward corresponding views (50, 51), but there is a lack of corresponding discussions in the field of LTC.

The indicators established in this research are further discussed from two aspects. On one hand, with the

TABLE 5 | LTCF's service capability evaluation index system.

Primary indicator	Secondary and tertiary indicators	Importance			Sensitivity			Accessibility		
		Mean	%	CV	Mean	%	CV	Mean	%	CV
1. Inputs	**1.1 Human resources (Secondary indicator)**									
	1.1.1 Total number of caregivers	4.600	86.67	0.160	5.000	100.00	0.000	4.429	86.67	0.171
	1.1.2 Total number of doctors	4.467	86.67	0.166	4.933	100.00	0.052	4.243	80.00	0.222
	1.1.3 Total number of nurses	4.667	93.33	0.132	5.000	100.00	0.000	4.643	100.00	0.107
	1.1.4 Total number of other technicians	4.200	86.67	0.241	4.933	100.00	0.052	4.267	80.00	0.187
	1.1.5 Ratio of actual open beds to caregivers	5.000	100.00	0.000	4.933	100.00	0.052	4.773	100.00	0.087
	1.1.6 Ratio of nurses to caregivers	4.600	100.00	0.110	4.933	100.00	0.052	4.267	93.33	0.139
	1.1.7 Percentage of certified caregivers at intermediate level and above	4.913	100.00	0.054	4.920	100.00	0.053	4.367	93.33	0.140
	1.1.8 Proportion of nurses with licensed nurse practitioner or above	4.600	100.00	0.110	4.920	100.00	0.053	4.300	93.33	0.138
	1.1.9 Number of doctors in shortage according to qualification standards	4.429	100.00	0.116	4.629	100.00	0.106	4.364	93.33	0.144
	1.1.10 Number of nurses in shortage according to qualification standards	4.514	100.00	0.112	4.700	100.00	0.098	4.379	100.00	0.111
	1.1.11 The professional title of director in LTCFs	4.233	73.33	0.194	4.800	100.00	0.086	4.107	80.00	0.184
	1.2 Facilities and equipment (Secondary indicator)									
	1.2.1 Number of registered beds	4.613	100.00	0.107	5.000	100.00	0.000	4.133	80.00	0.180
	1.2.2 Floor area per bed	4.536	73.33	0.175	4.929	100.00	0.054	4.250	80.00	0.177
	1.2.3 Floor area of rehabilitation room	4.533	86.67	0.164	4.867	100.00	0.072	4.253	100.00	0.167
	1.3 Capital investment (Secondary indicator)									
	1.3.1 Total annual capital expenditure	4.533	100.00	0.114	4.700	100.00	0.097	4.400	100.00	0.115
	1.3.2 Proportion of annual training expenditure to total expenditure	4.507	86.67	0.149	4.287	100.00	0.137	4.267	93.33	0.139
2. Activities	**2.1 Inspection services provided by medical staff (Secondary indicator)**									
	2.1.1 Doctor rounds per week (times/1 week)	4.633	100.00	0.104	4.633	100.00	0.104	4.267	100.00	0.107
	2.1.2 Daily inspections from caregivers (times/1 day)	4.920	100.00	0.053	4.573	100.00	0.108	4.633	100.00	0.104
	2.2 Health Management Services (Secondary indicator)									
	2.2.1 Physical assessment for the elderly (times/1 year)	4.433	100.00	0.112	4.267	100.00	0.107	4.040	80.00	0.150
	2.2.2 Nonpharmacological rehabilitation for dementia (times/1 week)	4.713	100.00	0.096	4.133	93.33	0.125	4.267	100.00	0.107
	2.2.3 Nonpharmacological rehabilitation for disabled elderly (times/1 week)	4.707	100.00	0.096	4.207	93.33	0.133	4.273	100.00	0.106
	2.2.4 Update of health records (times/1 year)	4.533	100.00	0.114	4.267	93.33	0.139	4.187	86.67	0.136
	2.2.5 Health education activities (times/1 year)	4.520	86.67	0.145	4.487	100.00	0.112	4.033	80.00	0.152
	2.2.6 Services from cooperative medical institutions (times/1 year)	4.333	80.00	0.188	4.660	93.33	0.107	4.200	73.33	0.205
	2.3 Institutional management (Secondary indicator)									
	2.3.1 Service satisfaction assessments from third parties (times/1 year)	4.147	93.33	0.124	4.187	80.00	0.163	4.013	86.67	0.225
	2.3.2 Quality evaluation from third parties (times/1 year)	4.400	100.00	0.115	4.167	80.00	0.168	4.213	93.33	0.183
	2.3.3 Satisfaction assessments within LTCFs (times/1 year)	4.333	93.33	0.142	4.127	80.00	0.202	4.033	93.33	0.165
	2.3.4 Quality evaluation within LTCFs (times/1 year)	4.500	93.33	0.126	4.227	80.00	0.215	4.173	93.33	0.180
	2.3.5 Whether to set up standardized care guidelines	4.867	100.00	0.072	4.600	100.00	0.110	4.447	86.67	0.165
	2.3.6 Percentage of performance rewards for caregivers	4.387	93.33	0.119	4.380	93.33	0.141	4.240	80.00	0.170
	2.3.7 Whether there is a post emergency physical assessment	4.553	100.00	0.110	4.507	100.00	0.111	4.267	86.67	0.165

Mean, mean score of each indicator from expert panel; %, consensus rate; CV, coefficient of variation.

implementation of the domestic pilot of LTCI, the management departments have developed basic qualification requirements for the resource input of designated LTCFs. In addition to the regulations on the number of personnel, it also considers the configuration of the personnel structure. Regarding the dimension of inputs, we consider that the absolute and relative

amounts of human, material and financial resources are common in the provision of services, of which the qualifications of professionals would have a positive effect on the quality of care. The selection of existing indicators is effectively connected with national norms.

On the other hand, we hold the point that the "activities" based on the core input resources is an important component of the proposed framework, which aims to cover various aspects of the care process. LTCFs provide services for people with disability and dementia who have a higher degree of LTC dependency. The professional services in these LTCFs are different from traditional life care services and are of great value for maintaining the physical function and health status of the elderly. The selected indicators, such as non-pharmacological rehabilitation services for elderly individuals with disability and dementia, are beneficial for reducing the occurrence of adverse events (such as falls and infections). The indicators are consistent with the focus of the current LTC disability grade assessment and are applicable to the whole country. On the part of institutional standard management, the internal satisfaction evaluation, quality inspection, and other indicators consistent with the national policy orientation are considered. The service frequency reflects the degree of importance these institutions attach to the improvement of service capability. At the same time, it covers the consideration of other standardized management measures such as regulations and incentives. In summary, based on the theoretical framework and the macro external environment (such as policy norms, institutional requirements, and market demand), the scope of service capabilities mentioned in this study covers the "inputs" and "activities" of the LTCFs. They are all key factors in the formation of service outcomes. Similar to the index system constructed in this study, the Organizational Capacity Assessment Tool User Guide (V.2.0 2016, funded by the European Union) and the organizational capability of hospitals developed by Jingyu Shi both adopted the idea of comprehensive rather than single-dimensional evaluation (52).

In general, the evaluation index system conducted in this study, combined with the background of the LTCI pilot program in China, considers the specific aspects of LTCFs and more comprehensively reflects their service capability. In the initial stage of LTC practice in China, it is feasible to collect data from LTCFs based on the indicators involved in this study. These indicators are usable for identifying the aspects that need greater focus and giving priority to certain improvements. This is a reliable reference for LTCF management, who have a big-picture understanding of overall operations to ensure the continuous improvement of service capability. International LTC practices attaches great importance to the concept of "person-centered care." Developed countries such as the United Kingdom, Sweden and Australia have gradually developed and applied the observable evaluation indicators, which reflect various subjective dimensions that are difficult to measure (53–55). With the improvement of LTC practice in China, further attention should be paid to the collection of relevant information from the user's perspective, such as the satisfaction of the elderly and their families, the service process that respect recipients' privacy and their living atmosphere. These contents are closely related to service capabilities and should be achieved through service regulation and professional training.

In the next step of the study, we will make a questionnaire to collect data from electronic records based on the final set of indicators and compute scores of service capability in LTCFs with appropriate statistical methods (comprehensive evaluation methods such as fuzzy Borda method). This is the conversion of scattered indicators into quantitative scores that can be compared between institutions. Combining empirical data with specific evaluation methods can not only obtain the total score of LTCF's service capability, but also obtain the score of each indicator in different dimensions. Feedback is sent back to the managers of the sample LTCFs and the relevant administrative authorities. This is a prominent manifestation of the practical value of this study, that is, it helps practitioners to identify the strengths and weaknesses of service capabilities. Therefore, service improvement plans are formed based on gaps in key dimensions. At the policy level, targeted support programs can be explored for the indicators that are generally weak in most LTCFs. We believe that aiming at the improvement of service capability will lead to improved service outcomes. An unavoidable limitation of this study is that some of the indicators should be moderately up to date to reflect the ever-changing development progress in the Chinese LTC system. In addition, the relatively small number of sample experts included in this study, although it meets the basic requirements of the Delphi method, is also a limitation that should be mentioned. If service providers or other stakeholders (experts by experience) are included in the panel, their views may add valuable information to our evaluation tool. In the future, by combing the front-end evaluation of service capabilities with the quality evaluation that emphasizes service results, more targeted and comprehensive institutional management strategies can be formed, which will help promote the progress of the LTC system.

CONCLUSION

In this study, the Delphi method was used to construct an evaluation index system for service capability that would be suitable for LTCFs. This is a relatively new perspective for developing indicators according to the characteristics of LTCFs in China. The set of indicators is supposed to quantify and visualize the gap between better LTC practice and policy guidance. They can also provide us with a comprehensive understanding of the current situation of LTCFs' capabilities in China, thus proposing a clear direction for improvement. The combination of indicators with empirical survey data is anticipated to be helpful to managers of LTCFs, government administrators, researchers, and others who want to make decisions, policies, and changes based on the information. Follow-up research can further explore the relationship between service capability and service outcome improvement.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

WL: conceptualization, methodology, software, data curation, investigation, visualization, and writing—original draft. MH: conceptualization, supervision, and writing—review and editing. WC: supervision and writing—review and editing. All authors read and approved the final manuscript before submission.

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Public trust in the long-term care insurance pilot program in China: An analysis of mediating effects

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Objective: This study aimed to evaluate the implementation of the long-term care insurance (LTCI) pilot program in China through an examination of public trust in the system and its associated factors of insurance awareness and satisfaction with the LTCI policy.

Method: An online survey was used to collect data from 786 participants in the city of Guangzhou, one of the pilot sites of the LTCI. Ordinal logistic regression models were used to investigate the related factors of public trust in the LTCI. Structural equation modeling (SEM) was conducted to test the mediating effect of satisfaction with LTCI policy on the relationship between insurance awareness and public trust.

Results: More than 60% of participants gave a positive evaluation of the LTCI pilot program. More than 70% of the participants recognized the important role of the program. Both an understanding of insurance and satisfaction with LTCI policies were associated with public trust. The proportion of the indirect effect with regard to the total effect of satisfaction on trust was 70.133%, greater than the direct effect of 29.867%.

Conclusions: Our findings supported the hypothesis that satisfaction with the LTCI policy plays a mediating role between insurance awareness and public trust. Optimalization of the LTCI policy was recommended to improve public trust in the LTCI program.

KEYWORDS

long-term care insurance, public trust, insurance awareness, public satisfaction, mediating effect

Introduction

The aging of the population poses a daunting challenge to the long-term care system in China. There were 52.71 million Chinese older adults with disabilities in 2020 and this number was projected to increase to 136.74 million by 2030 (1). It is estimated that the total economic costs of long-term care in China will increase from $68.69 billion dollars in 2020 to $246.76 billion (measured in 2010 US Dollars) by 2050 (2). Moreover, there are a significant number of older adults with disabilities that lack financial support and services for long-term care (3, 4).

China introduced a long-term care insurance (LTCI) program for older adults as a means to meet these challenges. In 2016, the Chinese pilot program was initiated in 15 cities (5) and expanded to include 14 additional sites in 2020 (6). According to the Chinese National Healthcare Security Administration, the number of LTCI enrollees in 15 pilot cities had reached 110 million in 2020 (7). Approximately 1.36 million people have received an LTCI benefit (7). The Chinese central government encouraged local governments to implement LTCI pilot programs in the context of local economy and population structure. Thus, there are significant disparities in the provision of LTCI benefits and long-term care services across these pilot sites. For example, several studies highlighted gaps in insurance coverage, eligibility, funding sources, and care provision (8, 9).

Several studies were conducted to evaluate the performance of the LTCI implementation in China. These studies found that China's LTCI system had significantly reduced beneficiaries' medical expenses (10) and the likelihood of older adults reporting unmet long-term care needs (11). People are willing to support an expansion of the formal implementation of LTCI policy in China (12). Although these studies provide empirical evidence of the implementation effects of LTCI programs in China, there is a lack of studies on public trust and satisfaction with LTCI programs in China. There is a need to evaluate the impact of LTCI policy development from diverse perspectives and using various evaluation methods (9).

The aim of this study was to evaluate the implementation effect of the LTCI pilot program in China through an examination of public satisfaction and trust in the system. Specifically, this study analyzed the complex relationships among insurance awareness, satisfaction, and trust in the LTCI pilot program based on the pilot city Guangzhou. Guangzhou is different from some of the other pilot cities—such as Shanghai and Qingdao—because the city has a lower proportion of aging population and a higher level of economic development in comparison to most other participating sites (13). The pilot program in Guangzhou was initiated in 2017. Compared with most pilot cities that only cover the individuals with severe disability, Guangzhou's LTCI program has a broader coverage. It covers all disabled persons and those with moderate and severe dementia (13). The reimbursement rate is among the highest in the pilot cities. The basic daily care expenses are paid by the LTCI fund with a maximum of 120 Yuan (about 18 US Dollars) per day for institutional care and a maximum of 115 Yuan (about 17 US Dollars) per day for home care (9).

Our study contributes to the literature by providing evidence on the relationship among insurance awareness, satisfaction, and trust. First, public satisfaction with the healthcare system is one of the indicators used by the World Health Organization (WHO) to evaluate the quality of healthcare systems (14, 15). Customer satisfaction has been the most frequently recognized pathway toward sustainable competitive advantage (16). Satisfaction represents an important dimension of the quality of a program. Second, universal health insurance coverage policies should be tailored to individual's needs and expectations as recommended by the WHO (17). Trust in the program proves crucial to the goal of ensuring that the LTCI serves the participants' best interests. Third, public trust and satisfaction are central to the implementation of the LTCI pilots. Trust leads to collaborative behavior and participation (18, 19). The effort to expand the pilot sites to the construction of a formal LTCI structure, simultaneously provides an opportunity for people to gain confidence in the system. Individual's acceptance and support of the pilot programs would encourage their attendance, an important indicator of the program's success. Finally, residents' trust in the LTCI can provide evidence for policymakers to used it as an indicator of the program's performance. Both public trust and satisfaction reflect a community consensus about public policy (20). In the context of this study, public trust and satisfaction were used to evaluate the feasibility of the LTCI pilot programs in China. Therefore, the findings from this study will inform future initiatives designed to promote the LTCI pilot programs.

Literature review and hypotheses

Insurance awareness and satisfaction

One of the potential predictors of the enrollees' satisfaction was their awareness related to the object evaluated (21, 22). Health insurance awareness refers to individual's knowledge of the availability and coverage afforded through health insurance (23, 24), their willingness to demand and use it (25), and their expectations with regard to its coverage, role in their own wellbeing, and implementation (26). Because of the complexity of the insurance policies, the awareness of health insurance depends on both the enrollees' education level (27, 28) and the developments integral to the insurance industry (29). According to the customer satisfaction theory (30, 31), satisfaction is a subjective feeling after comparing the actual situation with personal expectations. It is an attitude that is often accompanied by values about the object being evaluated (30). As a new insurance program in China, the construction of LTCI is based on the current status of economic development and population aging (6, 9). The Chinese government has adopted a path from pilot testing to implementation in order to build a LTCI system at a national level (13). In the process of piloting, the public's knowledge and understanding of LTCI have gradually improved, forming psychological anticipations for the LTCI system. According to the expectation theory (32), the residents' satisfaction with the LTCI system fundamentally depends on their expectations of the LTCI system. Previous studies found that individuals' awareness of health insurance positively predicted individuals' satisfaction with health insurance (21, 28, 33). Therefore, our first hypothesis is as follows:

Hypothesis 1: An individual's awareness of health insurance is positively associated with his/her satisfaction with the LTCI system.

Satisfaction and trust

Trust is a multidimensional concept that is comprised of competence and value congruence (34). It can be directed toward individuals, groups, organizations, or an operating system (35). Public trust in the public system is a basic factor in the operation of the public system and the efficiency of the health system (36). According to the customer perceived value theory (37), Higher satisfaction was associated with a positive value recognition of the object of evaluation and would result in greater trust (38). One study conducted in Indonesia indicated that patients' satisfaction had significant positive effects on trust in public hospitals (39). Similarly, satisfied insurance enrollees tend to trust their health insurance programs (21). Increased customer satisfaction results in an increase in the perceived value of insurance programs and an increased willingness to participate in public insurance plans (16). Based on the positive association between satisfaction and trust in previous studies (16, 21, 40), we proposed the second hypothesis:

Hypothesis 2: The individuals' satisfaction with the LTCI is positively associated with their trust in the LTCI system.

Insurance awareness and trust

Previous studies found linkages between consumers' awareness and cognitive-based trust, a part of overall trust that is based on the knowledge (40). For example, consumers' awareness of food safety certification was associated with their trust in food safety (41). Individuals with knowledge about the HPV vaccine were more likely to have trust in cancer information (42). Awareness and knowledge often lead to recognition and/or acceptance of a new social program (43). Studies have shown that people who participate in insurance have more trust in the insurance system than those who do not participate in it (44).

Based on the findings from previous studies, we assume that awareness of health insurance is associated with trust in the LTCI program. Firstly, LTCI is a type of social insurance that has only recently been introduced in China. Due to the limited number of pilot sites, not everyone has the opportunity to learn about LTCI. An awareness of the insurance program would imply that individuals have obtained knowledge about it and enjoy an opportunity to consider its value (23, 25). Secondly, individuals value public policies and consider them to be fair when the information comes from a trusted institution (19). The central government stipulated that local governments should provide publicity to improve awareness of the LTCI policy. Awareness of the LTCI would increase recognition of the newly built LTCI health system. This would increase their trust or confidence in LTCI program. In addition, the relationships between awareness and satisfaction, and between satisfaction and trust, would suggest that an improved awareness of health insurance could encourage greater levels of trust through the indirect path of improved satisfaction. Several studies show that satisfaction was a valid mediator between trust and its associated factors such as perceived value (21) and service quality (16). Thus, we argued that the satisfaction with LTCI mediates the relationship between awareness and trust in the LTCI system. Consequently, we proposed Hypothesis 3 and 4:

Hypothesis 3: An individual's awareness of LTCI is positively associated with their trust in LTCI system.

Hypothesis 4: Satisfaction is a mediator on the association between awareness and trust in the LTCI.

Materials and methods

Survey design

The questionnaire was designed to investigate the trust and satisfaction of Guangzhou residents on LTCI pilot. Privacy and confidentiality, the purpose of the study was stated at the beginning of the questionnaire, and the informed consent was completed prior to the data collection. The questionnaire included four sections: socio-demographic information, insurance awareness, satisfaction with the LTCI policy, and public trust. We found in the pilot survey that some residents did not understand the financing, payment and assessment procedures stipulated in the LTCI policy, on which we added explanations in the formal questionnaire.

The COVID-19 pandemic has forced many researchers to limit their work to online research. We conducted this cross-sectional survey through the *Wenjuanxing* platform from November 10 to 20, 2020. The *Wenjuanxing* platform is an open system that permits the collection of information through individual WeChat accounts (the most common social media in China). The platform has over 6.2 million registered users, and more than 10 million viewers every day. The platform provides the service of conducting surveys for specific targeted groups. It also ensures that only one submission may be received for each IP address. Participation was voluntary and anonymous. We employed the paid sampling service provided by the *Wenjuanxing* platform to send questionnaires to adult residents aged 18 and above in Guangzhou.

Participants

During the specified period of investigation, Wenjuanxing issued an invitation to 1,000 eligible individuals (residents aged

18 years and above) to fill out a survey questionnaire, of which 816 completed. In order to ensure the quality of the data, we excluded the participants with invalid response. We included a total of 786 eligible participants in the study.

Variables and measurement

Socio-demographic variable

Socio-demographic variables included gender (male = 0, female = 1), age (18–29 = 0, 30–44 = 1, 45 and older = 2), education level (below high school = 0, high school = 1, junior college = 2, bachelor's degree and above = 3), marital status (unmarried/divorced/widowed = 0, married = 1), health status (very bad = 0, bad = 1, fair = 2, good = 3, very good = 4), living arrangement (alone = 0, with others = 1), and income per month (<2,000 yuan = 0, 2,000–3,999 = 1, 4,000–5,999 = 2, 6,000–7,999 = 3, 8,000–9,999 = 4, 10,000+ = 5).

Response variable

The response variable of trust was a latent variable. After a thorough review of the literature, we adopted instruments from prior studies and used in our study. In a health insurance context, trust can be explained as enrollers' belief that they can rely on the insurance system. In this study, public trust was measured using two indicators adopted from Geng et al. (21) and Johnson and Grayson (40): willingness to provide a positive evaluation of the LTCI pilot program and perceived importance of the LTCI. The participants were asked the extent to which they would give a positive evaluation of the LTCI pilot program. The possible responses included very unwilling (0), unwilling (1), somewhat willing (2), willing (3) and very willing (4) by using a five-point Likert scale. Another question addressed how they would rate the importance of the LTCI system. Possible responses similarly ranged from very unimportant (0) to very important (4).

Explanatory variable

The explanatory variable of insurance awareness was measured using three items adopted from Reshmi et al. (24) and Kazaure (25). In this study, it reflected the evidence of commercial insurance awareness, social insurance awareness, and knowledge of the Guangzhou LTCI pilot. It included three indicators: the purchase of private insurance (No = 0, Yes = 1), participation in social medical insurance (No = 0, Yes = 1), and awareness of the LTCI pilot in Guangzhou (No = 0, Yes = 1).

Mediating variable

The mediating variable was satisfaction with the LTCI policies. We used three items modified from Geng et al. (21) and Liu et al. (44) to measure satisfaction with the LTCI policy. It indicates respondents' approval of the way that insurance funds were financed, reimbursement were paid, and the disability assessment procedures conducted. This variable included three satisfaction indicators: LTCI funding, LTCI payments, LTCI disability evaluations. Variables were scored on a four-point Likert scale that ranged from very dissatisfied (0) to very satisfied (4).

The information on the measurements of the latent variables including trust, insurance awareness and satisfaction are presented in the supplementary documents (Appendix, Supplementary Table S1). This self-constructed measuring tool for insurance awareness, satisfaction and trust, exhibited acceptable internal consistency with Cronbach's coefficient of 0.618, 0.723 and 0.634, respectively.

Statistical analyses

Data management and statistical analysis were performed using SPSS version 17 and IBM SPSS Amos version 21. The level of significance was at $p < 0.05$. Descriptive analysis was conducted for the socio-demographics variables, insurance awareness, satisfaction with LTCI policy, and public trust. Categorical variables are presented as frequency and percentage. To establish the conditions necessary for the test of the mediation relationship (45), Chi-square test was employed to detect correlation of categorical variables. The ordinal logistic regression models were used to investigate the related factors of public trust in the LTCI. The dependent variable in model 1 was participant willingness to provide a positive evaluation of the LTCI pilot. The dependent variable in model 2 was the importance they gave to the LTCI system. Social-economic variables were included in both models.

Structural equation modeling (SEM) was conducted to test the mediating effect of satisfaction with the LTCI policy in the relationship between insurance awareness and public trust. SEM has been widely used in healthcare services and outcomes research. For example, Geng et al. (21) used an SEM approach to assess patients' satisfaction with health insurance in China. A graphic presentation of the SEM model appears in Figure 1. A fully mediated relationship occurs when the influence of the explanatory variable occurs through the mediator, whereas a partially mediated relationship occurs when the influence of the explanatory variable is transmitted both as a direct effect by and an indirect effect through the mediator variable (45).

The Browne's asymptotically distribution-free method (46) was used to estimate parameters in the SEM model, considering that all observed variables were categorical and did not conform to the normal distribution. The bias-corrected percentile method was used to estimate

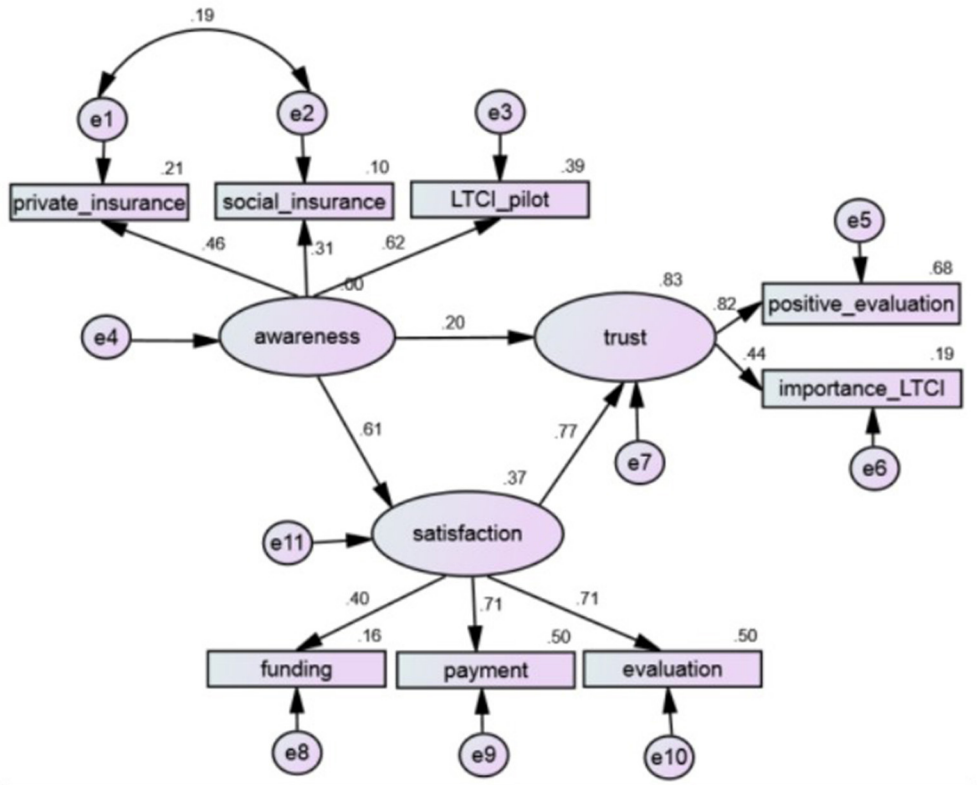

FIGURE 1
Structural equation modeling of satisfaction as a mediator of trust.

the 95% confidence intervals of standardized coefficients. Bootstrapping with 2,000 random samples was used to test robustness of mediating effect (47). The model goodness-of-fit was evaluated by indices including a normed chi-square (equal to chi-square divided by its degree of freedom, values < 5), the root mean square error of approximation (RMSEA, values < 0.08), the Tucker-Lewis index (TLI, values > 0.95), and the comparative fit index (CFI, values > 0.95) (48).

Results

Description of the study sample

Table 1 shows the demographic characteristics of the respondents. The sample was comprised of 54.42% women and 47.58% men. More than 60% of respondents were under the age of 45, had a bachelor's degree or above, were married or cohabiting, and in good health. More than 80% of the respondents lived with others. The number of respondents with a monthly income of more than 6,000 yuan accounting for ~60%.

Insurance awareness, satisfaction with the LTCI policy, and public trust

The participants demonstrated an understanding of available insurance plans. Approximately 70% of the respondents had purchased commercial insurance, 78.5% of the respondents participated in social medical insurance plans, and 45.7% of the respondents were aware that Guangzhou was piloting an LTCI system.

The participants' responses indicated a reasonable level of satisfaction with long-term insurance policies. Forty Four percent of them were satisfied and 20.87% were very satisfied with the way that funds were financed. In addition, participants who were very satisfied (8.65%) and those who were satisfied with reimbursement payment accounted for 65.27% of the sample. Participants who were satisfied (46.18%) and very satisfied (9.16%) with the disability evaluation exceeded 50% of all responses. These figures indicate that the public's satisfaction with the LTCI pilot policy was in a medium to high level.

A total of 62.59% were either willing (49.36%) or very willing (13.23%) to give positive evaluation to the LTCI pilot. Approximately half (48.1%) of the respondents believed that LTCI played an important role and nearly one-third of them

TABLE 1 Descriptive statistics of the survey sample ($N = 786$).

Variables			Frequency (n)	Percentage (%)
Socio-demographic variables	Gender	Female	412	52.42
		Male	374	47.58
	Age	18∼29	241	30.66
		30∼44	283	36.01
		45 or above	262	33.33
	Education level	Below high school	33	4.20
		High school	91	11.58
		Junior college	163	20.74
		Bachelor's degree or above	499	63.48
	Marital status	Unmarried/divorced/widowed	268	34.10
		Married	518	65.90
	Self-rated health status	Very bad	3	0.38
		Bad	40	5.09
		Fair	218	27.74
		Good	375	47.71
		Very good	150	19.08
	Living arrangement	Alone	121	15.39
		With others	665	84.61
	Income per month	<2,000 yuan	157	19.97
		2,000∼3,999 yuan	54	6.87
		4,000∼5,999 yuan	131	16.67
		6,000∼7999 yuan	144	18.32
		8,000∼9,999 yuan	152	19.34
		10,000+ yuan	148	18.83
Insurance awareness	Purchase of private insurance	No	239	30.40
		Yes	547	69.60
	Participating social insurance	No	169	21.50
		Yes	617	78.50
	Knowledge of LTCI pilot	No	427	54.33
		Yes	359	45.67
Satisfaction with LTCI policies	Satisfaction with funding	Very dissatisfied	5	0.64
		Dissatisfied	60	7.63
		Neither satisfied nor dissatisfied	208	26.46
		Satisfied	349	44.40
		Very satisfied	164	20.87
	Satisfaction with payment	Very dissatisfied	6	0.76
		Dissatisfied	43	5.47
		Neither satisfied nor dissatisfied	310	39.44
		Satisfied	359	45.67
		Very satisfied	68	8.65
	Satisfaction with disability evaluation	Very dissatisfied	6	0.76
		Dissatisfied	58	7.38
		Neither satisfied nor dissatisfied	287	36.51
		Satisfied	363	46.18
		Very satisfied	72	9.16

(Continued)

TABLE 1 Continued

Variables			Frequency (n)	Percentage (%)
Trust in LTCI	Willingness to recommend the LTCI pilot	Very unwilling	5	0.64
		Unwilling	18	2.29
		Not so willing	271	34.48
		Willing	388	49.36
		Very willing	104	13.23
	Importance of LTCI	Very unimportant	11	1.40
		Unimportant	19	2.42
		Not so important	138	17.56
		Important	378	48.09
		Very important	240	30.53

LTCI, long-term care insurance.

(30.5%) believed that it played a very important role, accounting for more than three quarters (78.6%) of the total sample. This finding demonstrated that residents had a high degree of trust in the pilot system of LTCI in Guangzhou.

The results of correlation analysis of insurance awareness, satisfaction, and trust are presented in Table 2. There were significant correlations between any two of the manifest variables.

Analysis of ordinal logistic regression results

Table 3 shows the results of the ordinal logistic regression model, including the coefficient estimates, 95% confidence interval, standard errors, and *p*-values. Findings from models 1 and 2 show that residents who had not purchased commercial insurance and did not know that Guangzhou was piloting an LTCI were less likely to give a positive evaluation of the Guangzhou LTCI pilot system. This suggests that they did not believe that the LTCI would be worthwhile. The residents who were less satisfied with the LTCI fund-raising, reimbursement payment, and evaluation processes did not trust the LTCI system.

Mediating effect of policy satisfaction

The fit indices of the structural equation models are presented in Table 4. The model fitting for the mediating effect of public satisfaction was satisfactory [χ^2 (16, N = 786) = 29.912, p = 0.018; TLI = 0.978, CFI = 0.988, RMSEA = 0.033]. The p-value of all standardized path coefficients was <0.01, indicating that the relationships among explanatory, response, and the mediating variables were significant.

The decomposition of direct and indirect effects of each factor in the structural model also proved noteworthy. Table 4 illustrates the direct positive effect awareness had on public trust. Policy satisfaction significantly mediated the indirect effects that awareness had on public trust. For example, both the direct ($\beta = 0.201$, $p < 0.001$) and mediated effects ($\beta = 0.472$, $p < 0.001$) of awareness on public trust were significant. Among the total effects ($\beta = 0.673$, $p < 0.001$), the direct effect accounted for 29.867% of the total effect and the indirect effect accounted for 70.133%. These findings indicate that policy satisfaction partially mediated the relationship between insurance awareness and public trust in the LTCI system.

Discussion

This study addresses knowledge gap by presenting new empirical evidence on the awareness of and satisfaction with the LTCI policy, and trust in the pilot program in Guangzhou, China. The mediating role of satisfaction in the relationship between the awareness of insurance and trust in the LTCI program was examined. The findings support the proposed hypotheses. This study shows that insurance awareness had a significant direct effect and a significant indirect effect on the participants' trust in the LTCI program, with satisfaction as a mediator. This study's focus on the relationship between insurance awareness and trust in LTCI system provides a novel approach to evaluate the implementation of the LTCI program in China. The results could be used as baseline information for future research on the effectiveness of China's new policies on improving public satisfaction toward public insurance.

The further development of the LTCI in China may bring many potential social and economic benefits. The rising burden of long-term care has been a source of great concern. The LTCI is considered as a national policy that this program can be a viable (49). The LTCI pilot program has made some broad impacts on other programs since its implementation.

TABLE 2 Correlation analysis of insurance awareness, satisfaction, and trust.

	X1	X2	X3	Y1	Y2	Y3	Z1
X2	74.108***						
X3	60.968***	33.464***					
Y1	10.810*	13.542**	18.908**				
Y2	38.474***	21.794***	58.648***	146.524***			
Y3	34.307***	12.320*	68.809***	128.079***	359.616***		
Z1	57.855***	21.356***	102.090***	155.316***	377.887***	528.638***	
Z2	12.961*	26.572***	26.342***	145.853***	109.194***	121.437***	247.441***

X1, Purchase of private insurance; X2, Participating social insurance; X3, Knowledge of LTCI pilot; Y1, Satisfaction with funding; Y2, Satisfaction with Payment; Y3, Satisfaction with disability evaluation; Z1, Willingness to recommend the LTCI pilot; Z2, Importance of LTCI. *$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

TABLE 3 Analysis of factors associated with trust in the long-term care insurance system by ordinal logistic regression.

	Model 1				Model 2			
	Estimated coefficient	*P*-value	95% Confidence Interval		Estimated coefficient	*P*-value	95% Confidence Interval	
			Lower bound	Upper bound			Lower bound	Upper bound
Insurance awareness								
Purchase of private insurance (yes = 0)	−0.522	0.004	−0.881	−0.163	−0.323	0.044	−0.638	−0.008
Participating social insurance (yes = 0)	−0.080	0.729	−0.529	0.370	−0.161	0.425	−0.557	0.235
Knowledge of LTCI pilot (yes = 0)	−0.791	0.000	−1.127	−0.455	−0.397	0.007	−0.683	−0.110
Policy satisfaction								
Funding = 0	−0.768	0.439	−2.712	1.176	−1.512	0.091	−3.264	0.241
1	−0.554	0.094	−1.203	0.094	−1.389	0.000	−1.986	−0.791
2	−0.965	0.000	−1.437	−0.493	−1.006	0.000	−1.442	−0.570
3	−0.373	0.071	−0.779	0.032	−0.458	0.018	−0.838	−0.077
Payment = 0	−2.961	0.002	−4.862	−1.059	−1.320	0.123	−2.996	0.356
1	−3.124	0.000	−4.080	−2.167	−1.168	0.007	−2.019	−0.316
2	−2.040	0.000	−2.700	−1.379	−1.182	0.000	−1.808	−0.556
3	−0.897	0.003	−1.488	−0.306	−0.590	0.045	−1.168	−0.012
Evaluation = 0	−5.786	0.000	−7.608	−3.964	−2.966	0.000	−4.617	−1.316
1	−2.468	0.000	−3.312	−1.625	−0.708	0.071	−1.477	0.062
2	−1.856	0.000	−2.497	−1.215	−1.000	0.001	−1.608	−0.392
3	−0.681	0.020	−1.255	−0.107	−0.632	0.027	−1.193	−0.071

Social-economic variables were controlled.

For example, Shanghai promoted the development of the long-term care industry through the elaboration of action plans to encourage employment in this industry and trained 68,000 frontline workers (50). The city of Nantong was able to reduce medical expenses for families with a disabled person from 162 million yuan ($25.5 million dollars) to 99.7 million yuan ($15.7 million dollars, about 38.5%) since the launch of LTCI pilot (51). Further study of people's attitudes about the implementation of the pilot program are needed because public satisfaction and trust could be important driving forces for the promotion and implementation of the LTCI program in an acceptable and sustainable way (12).

The findings from this study suggest that participants held high expectations for the role that the LTCI program could play. Yet 40% of participants did not provide a positive feedback, which indicates a need to improve public confidence in the system. Trust is a complex concept involving both cognitive and emotional dimensions (34). The cognitive aspect of trust in this case could stem from confidence in the Chinese government's will in implementation of the program in the

TABLE 4 Decomposition of mediating effects of policy satisfaction.

Effect	Standardized coefficients	Percentage of SC	Lower bounds	Upper bounds
Direct	0.201	29.867	0.020	0.358
Indirect	0.472	70.133	0.372	0.737
Total	0.673	100.00	0.573	0.836

SC, Standardized coefficients. All the coefficients are significant at level 0.01. The response variable is trust.

program's development and promotion (9, 12). Although the Chinese government has been determined to make the LTCI the "sixth insurance" of the social security system, only a small fraction of adult populations have been covered through the pilot program (7). In addition, there are many persistent issues in the supervision and management of the system (9, 13). That is to say, existing problems in the delivery of the long-term care services may affect the public's opinion with regard to the fairness and accessibility of the insurance and hinder people's willingness to evaluate the program in a positive way.

Consistent to the previous studies, the findings from our study show that insurance awareness is correlated with policy satisfaction (21, 33, 52). Participants who exhibited greater levels of understanding of insurance programs expressed a greater satisfaction with the LTCI policy. We also found that satisfaction mediated the effect of health insurance awareness on trust in the LTCI program. This finding adds new knowledge to the literature which study mediates effect of satisfaction between perceived value and trust in public health insurance (21) and between healthcare service quality and trust in care providers (16).

The findings of this study have the potential to inform policy and practice by addressing the ways in which trust in LTCI program could be improved. First, individual' s awareness of insurance should be improved. This study shows that participants' insurance awareness was at a moderate level, primarily reflected in the finding about their limited knowledge toward the LTCI pilot program in Guangzhou. There is a need to improve awareness of the LTCI program *via* a variety of approaches. For example, the government should strengthen the visibility of LTCI through social media, including official website, MicroBlog, WeChat, and community outreach. The LTCI staffs should actively provide explanations for LTCI policy which benefit to the insured to increase their knowledge of LTCI.

Second, there is a need to improve individual's satisfaction with LTCI policy in order to increase the trust toward LTCI system. The survey in this study demonstrates that participants were not highly satisfied with the existing LTCI policy. There are several possible reasons for this. First, the participants did not know much about the LTCI policy in terms of its limited coverage (7, 9). Second, they were not satisfied with the policy terms because of unequal access to LTCI (53). Third, the policy clauses and payment procedures were too complicated and difficult for people to understand. Satisfaction, coupled with trust, could reflect the effectiveness of pilot implementations (44). Therefore, it is important to strengthen policy design of the LTCI program to be more person-centered and optimize the insurance policy by simplifying the reimbursement payment process and evaluation procedures. In addition, measuring residents' perspective of LTCI is essential to know and meet their need for LTCI which would further increase their satisfaction with LTCI.

There are several limitations to this study that needs to be acknowledged. Our sample is limited to one LTCI pilot site. Therefore, the findings from this study could not be generalizable to the general populations in other regions in China. However, we sought to create as much variation in the survey as possible through the recruitment of a large sample of respondents. Further research in other regions and with participants with a variety of demographic profiles would be needed to extend our findings. The second limitation is that the data collection was limited to online survey, due to the social distancing requirement in place due to COVID-19 during the time of the study. Consequently, the study was not able to include people who lacked internet access, smartphones, or computers. The findings of this study should not be considered to be representative. Another limitation was the relatively moderate internal consistency of our self-constructed measuring tool for insurance awareness, satisfaction and trust. We Further research is needed to include instruments with high validity and sensitivity. Finally, due to the cross-sectional survey of the study, we were only able to test the associations across study outcomes of the interest. While our study provides useful new knowledge, future research is needed to conduct relevant longitudinal surveys.

Conclusion

This study shows that there is a need to improve the residents' satisfaction with and trust toward the pilot of LTCI system in China. Participants' awareness of insurance and satisfaction with LTCI policies significantly affect their trust in the LTCI system. Satisfaction with LTCI policies plays a mediating role in the relationship between

insurance awareness and trust. In order to successfully expand LTCI pilot program, there is a need to use multiple approaches to improve insurance awareness and to optimize LTCI policy and promote trust toward LTCI among general population.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Author contributions

RP designed the study and secured funding. WZ and RP analyzed data and drafted the manuscript. XD contributes to method and editing. BW contributes to study design and editing. All authors reviewed, provided feedback on, and approved the final manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2022.928745/full#supplementary-material

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Relationship between unmet needs for assistance and healthy aging among disabled older adults in China

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Background: Although there is a growing consensus around the world that long-term care services and supports are important to help the aged population with disabilities achieve healthy aging, a misallocation of care resources and inefficiency in care delivery still exist in China. The absence or inadequate provision of long-term care services and supports among older adults with disabilities results in a range of adverse health consequences. However, the negative influence of unmet needs for assistance on healthy aging, based on functional perspectives including physiological, psychological, and societal domains, has been underestimated. This study aimed to measure healthy aging based on a person-centered approach and examine the relationship between unmet needs for assistance and healthy aging among older adults with disabilities in China.

Methods: Based on the data from the Chinese Longitudinal Healthy Longevity Survey 2018, we used the latent profile analysis with three indicators to uncover distinctive types of older adults experiencing distinct levels of healthy aging, and applied the ordered logit regression to analyze the correlation between unmet needs for assistance and different levels of healthy aging. To further address the endogeneity bias, the robust test was conducted by the two-stage least-squares instrumental variable estimation and the conditional mixed process instrumental variable estimation.

Results: Three ordered latent classes were identified: a low level of healthy aging (42.83%), a middle level of healthy aging (47.27%), and a high level of healthy aging (9.90%). Disabled older adults with unmet needs had a lower probability of achieving the higher level of healthy aging ($OR = 0.57$, $SE = 0.04$, $CI = 0.48–0.66$, $p < 0.001$).

Conclusions: This study highlights the need to increase awareness among gerontological practitioners with respect to long-term care services and supports for disabled older adults as a potential for enhancing their healthy aging, and that unmet needs could be a basis for risk assessment and a means for determining the efficacy of long-term care interventions on maintaining health.

KEYWORDS

unmet needs, health, activities of daily living, cognition, participation

Introduction

As a response to the expansion of life expectancy but the increase of years lived in poor health over the past three decades (1), policy decisions concerning ways to advance healthy aging have become part of health and social agendas for many countries. However, there is some difficulty in developing policy aimed at advancing healthy aging while there remains confusion as to the definition and measurement of the concept itself. Existing studies created different operational definitions of healthy aging from more to less rigid and identified the respondents experiencing healthy aging by using different definitions. They found that the use of definitions that emphasize functional limitations is more useful in distinguishing the truly healthy from the truly unhealthy than the use of ones that are based on rigid disease criteria (2). Therefore, although there appeared to be no agreed standard by which aspect of healthy aging could be measured, there was consensus in the studies that the multidimensional and positive health outcome should be used to capture the capacity to function well and adapt to environmental challenges, including assessing physical functioning, most frequently a measure of activities of daily living (ADLs), mental functioning, most frequently a measure of cognition, and social functioning, most frequently a measure of social participation (3, 4).

There is a growing consensus around the world that long-term care (LTC) services and supports are important to help the aged population with disabilities achieve healthy aging under the new concept of healthy aging proposed by the World Health Organization (WHO) (5). The provision of continuous and adequate LTC services and supports for older adults in need can help them maintain the highest possible quality of life with the greatest possible degree of independence, autonomy, participation, personal fulfillment, and human dignity (6). In China, 35 cities in 14 provinces have begun to launch LTC insurance programs as pilots toward a nationwide LTC insurance program since 2016, and the number of pilot cities has been expanded to 49 since 2020. Although LTC services and supports have developed since the 2010s in China, there is still a misallocation of care resources and inefficiency in care delivery. As of 2018, nearly 3% of community-living Chinese older adults with disabilities reported that they did not receive any help with ADLs, defined as completely unmet needs, and over 50% of them reported that the assistance they received did not fully meet their needs, defined as under-met needs (7). More rural older residents experienced completely unmet needs than urban residents (8). From 2005 to 2014, the proportion with completely unmet needs almost doubled for all disabled older adults (7).

The absence or inadequate provision of assistance with daily living tasks among older adults with disabilities can result in a range of adverse consequences. Prior research used descriptive statistics to report that the prevalence of people experiencing adverse consequences, such as not being able to bathe or shower, not being able to put on clean clothes, falling out of bed or a chair, wetting or soiling oneself, or going hungry, was greater for those with unmet vs. met needs (9, 10). Other longitudinal studies focusing on the adverse health-related consequences reported that unmet needs for assistance might increase the risk of death (11, 12), hospitalizations (13, 14), and rehospitalizations (15, 16), and also exacerbate depressive symptoms (17). Deterioration in health in turn will increase service uses and the risk of experiencing unmet needs (18, 19). As thus, the provision of sufficient LTC services and supports is a fundamental social intervention to achieve healthy aging.

Existing research focused on the impact of unmet needs for assistance on the biomedical level of health while overlooked its influence on the psychosocial perspective, which is a crucial component of healthy aging. And thus, the adverse health-related consequences of unmet needs might be underestimated. Contrary to the traditional biomedical model, the biopsychosocial model and the new concept of healthy aging emphasize the maintenance of functioning, which is determined by assessing physical and mental capacities and the interactions with the environment (5, 20). It is necessary to consider multiple indicators of healthy aging at the same time because there are often reciprocal relationships between functional limitations, cognitive impairment, and social participation, which result in clustering of personal features. However, ADLs and cognitive function, the main indicators of physical and mental capacities (5), have been overlooked in the studies of adverse consequences of unmet needs. In addition, the relationship between unmet needs and participation, an indicator which has been defined as the observable performance within a life situation and viewed as a societal perspective of functioning (21), has not been examined either.

The disablement process model proposed by Verbrugge and Jette elucidated the causal process from disease to disability, which indicated that adequate personal assistance provided for people during the disablement process could reduce their difficulties in performing expected or specified social role activities (22). Grossman's framework of a health production function also pointed out that individuals' initial stock of health tended to depreciate with aging, but could be enhanced by investments in oneself over time (23). LTC services and supports are important investments in maintaining and improving the performances of ADLs among older adults with disabilities.

Abbreviations: ADLs, Activities of Daily Living; AIC, Akaike's Information Criterion; aBIC, adjusted Bayesian Informal Criterion; BIC, Bayesian Informal Criterion; CLHLS, the Chinese Longitudinal Healthy Longevity Survey; CMP, Conditional Mixed Process Model; IADLs, Instrumental Activities of Daily Living; LMR-LRT, Lo-Mendell–Rubin Likelihood Ratio Test; LPA, Latent Profile Analysis; LTC, Long Term Care; MMSE, Mini Mental State Examination scale; SE, Standard Error; WHO, World Health Organization; 2SLS, Two Stage Least Squares.

And thus, disabled older adults with unmet needs for assistance would experience more severe impairments in ADLs than those with met needs.

Basic mental actions include central cognitive and emotional functions (22). Prior research showed an adverse consequence of unmet needs for emotional functions (17). Although there is no direct evidence for the correlation between unmet needs for assistance and cognitive function, a few studies reported that larger social networks or more social supports were associated with better cognitive function among older adults (24–28). Considering that unmet needs for assistance indicate the absence or inadequate provision of LTC services and supports provided by formal or informal caregivers, disabled older adults with unmet needs for assistance may experience more severe functional limitations in cognition than those with met needs.

A few studies have shown that adequate social supports have a positive influence on participation in various activities among older adults and patients with chronic diseases (29–32), but very few directly examined the impacts of unmet needs for assistance on participation among disabled older adults. Chong et al. (33) indicated that unmet needs for home and community-based services were associated with a lower likelihood of being active in the community and interacting with families and friends among Medicaid users (33). Since older adults with disabilities have reduced levels of social participation, adequate assistance and supports are prerequisites for them to participate in community and social activities (34), which are further associated with better health and social well-being (35–38).

As the definition of healthy aging ranged from a primarily biological model to a comprehensive biopsychosocial model, most recent studies emphasized the maintenance of functional independence in their definition and measured healthy aging based on physiological, psychological, and societal domains. Although existing studies used national survey data to estimate the prevalence of healthy aging, cut-off scores on the measures selected were based on the distribution in the study population and to capture those functioning above the median (39), in the top tertile (40), quartile (41), or quintile (42). WHO theoretically divided the trajectory of functional ability into three periods, including a period of relatively high and stable capacity, a period of declining capacity, and a period of significant loss of capacity (5), but little empirical research has been conducted to distinguish healthy aging into such different levels. In order to fill the above research gaps and inform policy development, this study used the national data to generate the typology of older persons experiencing different levels of healthy aging based on a person-centered approach, and thus proposed the first hypothesis: Older adults would be classified as experiencing a low level, a middle level, and a high level of healthy aging, respectively.

Previous studies have established the relationship between unmet needs and a set of single health indicators, mainly representing the biomedical level of health (11–17), but little is known about whether the absence or inadequate provision of LTC services and supports will prevent the aged population with disabilities from achieving a higher level of healthy aging. Understanding the relationship between unmet needs for assistance and different levels of healthy aging can provide evidences for incorporating unmet needs into the need assessment and establishing a precise LTC service supply and subsidy mechanism based on unmet needs, and also for developing an alternative health intervention that regards unmet needs as a risk factor. To fill the research gaps, we further examined the correlation between unmet needs for assistance and different levels of healthy aging among Chinese older persons with disabilities, and thus propose the second hypothesis: Disabled older adults with unmet needs for assistance would have a lower probability of achieving a higher level of healthy aging than their counterparts with met needs.

Methods

Data source and samples

In this study, we employed data from the Chinese Longitudinal Healthy Longevity Survey (CLHLS), a nationwide survey that collected data on both the extent to which disability-related needs were met and healthy aging among the Chinese aged population. CLHLS is a nationally representative survey of the older population aged 65 or older from 23 (out of 31) provinces in China, with an oversampling of the oldest-old aged 80 and older (43). CLHLS has 8 waves (1998, 2000, 2002, 2005, 2008, 2011, 2014, and 2018), and survey respondents were randomly chosen from half of the counties and cities in the 23 selected provinces, where the population constituted 85% of the total population in China (44). Zeng described in detail the survey design, sample distribution, and data quality of the CLHLS (44). This study employed the Wave 8 survey data because it is the latest wave.

The 2018 follow-up survey contains 15,779 respondents aged 65 years and above. Considering that this study focused on ADL care needs and the analysis of unmet needs should target the population with care needs, the study sample excluded 11,030 (69.90%) respondents who reported having no disabilities, defined as having no limitations in six ADLs. Among the 4,749 respondents with disabilities who had at least one ADL limitation, 1,870 (39.38%) of them had missing data on dependent variables, independent variables, or control variables. After excluding respondents with missing data, the final analytic sample included 2,879 older adults with disabilities.

Measures

Dependent variables

The healthy aging level was the dependent variable in this study. According to the definition of healthy aging, we selected

three indicators to generate the typology of older persons experiencing different levels of healthy aging, including ADLs, cognition, and participation.

ADLs were evaluated by Katz's index of ADLs, which has been demonstrated as a reliable scale to assess ADLs (Cronbach's a = 0.75) (45). The index consisted of six items including bathing, dressing, toileting, eating, indoor transfer and continence. Regarding each activity, respondents were asked "do you require assistance when performing each activity (e.g., eating)." The answer option that they performed the activity by themselves was coded two. The answer options that they required some or complete help with that ADL were coded one or zero, respectively. As such, the total score ranged from 0 to 12, with an equally weighted sum of the six items. Since respondents without ADL limitations were excluded from the final analytic sample, the total score of ADLs ranged from 0 to 11, with a higher score indicating fewer ADL limitations. ADLs, cognition, and participation were measured on different scales, so z-scores were calculated by subtracting the mean score of study sample from the original score and then dividing the standard deviation, so as to make them more comparable when generating the typology of older persons experiencing different levels of healthy aging.

Cognition was measured by the Mini-Mental State Examination scale (MMSE) (46) with a Cronbach's alpha value of 0.97. The scale consisted of twenty-four items to test five domains of cognitive function, which included abilities of orientation, registration, attention and calculation, recall, and language. The total score ranged from 0 to 30, with a higher score indicating better cognitive function. We used the z-score of cognition to generate the typology of older persons experiencing different levels of healthy aging.

Participation has been usually measured by the performance in a standard set of roles and activities. For people with disabilities, domestic life (including household tasks, caring for household objects, etc.) and community and social life (including recreation and leisure, community life, etc.) are important participation domains, which can help slow functional decline (21, 35). Thus, participation in this study was measured by the frequency of involvement in domestic activities (including housework, garden work, and raising domestic animals) and community and social activities (including personal outdoor activities, reading newspapers/books, playing cards/mah-jong, watching TV/listening to the radio, organized social activities). For each of the eight activities, respondents were asked "do you perform each activity regularly (e.g., housework)." The response options, "almost every day," "at least once a week," "at least once a month," "not every month," or "never," were coded 4, 3, 2, 1, and 0, respectively. As such, the total score of all the activities ranged from 0 to 32, with a higher score indicating higher participation. Additionally, we used the z-score of participation to generate the typology of older persons experiencing different levels of healthy aging.

Independent variable

Informed by previous studies (7, 19), unmet needs for assistance with ADLs, a dummy variable, was selected as the independent variable in this study. Respondents were asked "who is the primary caregiver when you require assistance with the ADLs?" Respondents choosing "nobody" were considered to have a completely unmet need for assistance, while others choosing any caregiver (including spouse, son, daughter-in-law, daughter, son-in-law, unmarried son and daughter, grandchildren, other relatives, neighbors, social service, and housemaid) were further asked "did the help that you received with the ADLs meet your needs?" Respondents who reported that the assistance they received only met part of their needs or did not meet them at all were considered to have an under-met need for assistance, while those who reported having their needs fully met were considered to have a met need for assistance. Respondents who experienced an under-met need or completely unmet need were considered to have an unmet need.

Control variables

Demographic characteristics, socioeconomic status, health status and behaviors, and availability of medical insurance and services might confound the relationship between unmet needs and different levels of healthy aging (23, 47), and have been controlled in the analyses. Demographic characteristics included age (in years), gender (female = 1), marital status (currently married = 1), rural-urban residence (urban residence = 1), and geographic area (east =1, central =2, west =3). Socioeconomic status was measured with education level (educated = 1) and self-reported sufficiency of income (had sufficient income = 1). Health status and behaviors were measured by chronic illnesses, smoking, drinking, and doing exercises, all of which were dummy variables. Availability of medical insurance was coded one when respondents reported that they had medical insurance, otherwise, coded zero. Availability of healthcare services was coded one when respondents reported that they received adequate healthcare services when they were sick, otherwise, coded zero.

Data analysis

First, we used descriptive statistics to report the characteristics of the study sample. To explore ordered latent classes of older adults experiencing different levels of healthy aging, we conducted latent profile analysis (LPA) with three observed standardized indicators, including ADLs, cognition, and participation. LPA is a statistical method that identifies unobserved classes within a population based on responses to a set of observed continuous variables (48). The number of latent classes is determined by a variety of statistical indices, including Akaike's Information Criterion (AIC) (49), Bayesian Informal

Criterion (BIC) (50), adjusted BIC (aBIC) (51), Entropy, and the *p*-value of the Lo-Mendell–Rubin Likelihood Ratio Test (LMR-LRT) (52). Better model fit is determined by lower values of AIC, BIC, and aBIC, and better separation of latent classes is indicated by higher Entropy values (53). Besides, the significant *p*-value of the LMR-LRT indicates that the model with k classes fits the data better than the more parsimonious model with k-1 classes (53). There are two parameters estimated with LPA that are important for this study. The first is the mean of each indicator, which endorse each observed indicator within a given latent class and are used to interpret and label each identified class. The second parameter is the probability of class membership, which describes the probability distribution of the latent classes, which sum to one. Overall, model fit, parsimony, interpretability of latent classes, and probabilities of class membership determines the optimal model (54).

Second, the ordered logit regression model, appropriate for ordinal-category outcome variables, was estimated to test the association between unmet needs for assistance and different levels of healthy aging, while controlling for confounding variables. However, the relationship between unmet needs and healthy aging might be spurious for two reasons. First, reverse causality might exist due to the simultaneous determination of these variables. Second, although we have controlled for many potential confounders, there might be unobserved heterogeneity due to omitted variables. In order to address these endogeneity problems, this paper further used the two-stage least squares (2SLS) model, appropriate for continuous outcome variables, and the conditional mixed process (CMP) model, appropriate for both continuous and categorical outcome variables, to conduct the instrumental variable estimation. The provincial old-age dependency ratio, calculated by the ratio of the number of people aged 65 or above to that aged 15–64 in each province, was utilized to construct the instrumental variable, because it was not directly correlated with individuals' health conditions but showed a strong correlation with unmet needs with the *F* value of 15.33 in the weak instrumental variable test. The LPA models were estimated with Mplus, version 8.3, and other analyses were performed using Stata, version 15.1.

Results

Sample characteristics

Table 1 shows the characteristics of the study sample. Around half of the respondents had unmet needs for assistance. The average age of the respondents was 95 years old. About 70% of the respondents were female. Less than 20% of the respondents were currently married. Sixty perecent of the sample individuals resided in urban areas. More than half of the respondents lived in eastern areas. More than 30% of the respondents ever received education. More than 80% of them reported sufficient income. 74% of the respondents suffered from at least one chronic disease. Less than 10% of the respondents smoked or drank wine. The number of the respondents taking exercises accounted for no more than 15%. More than 80% of the respondents had medical insurance, and around 95% of the sample individuals received adequate healthcare services when they were sick.

Indicators and levels of healthy aging

Table 1 also presents the distribution of three healthy aging indicators. The average score of ADLs was 7.05 among respondents. Respondents' mean value of cognition score was 14.30. The average score of participation was 3.0.

TABLE 1 Sample characteristics (Means/Proportions) ($N = 2879$).

Variables	Mean (SD)/N (%)	Variables	Mean (SD)/*N* (%)
Unmet needs for assistance	1452 (50.43%)	**Health status and behaviors**	
Demographic characteristics		Had chronic illness	2132 (74.05%)
Age	94.95 (8.44)	Smoked	217 (7.54%)
Female	1929 (67.00%)	Drank	200 (6.95%)
Currently married	462 (16.05%)	Took exercises	364 (12.64%)
Urban residence	1747 (60.68%)	**Availability of medical insurance and services**	
Geographic area		Had medical insurance	2367 (82.22%)
East	1605 (55.75%)	Received adequate healthcare services	2751 (95.55%)
Central	746 (25.91%)	**Indicators of healthy aging**	
West	528 (18.34%)	ADLs	7.05 (3.36)
Socioeconomic status		Cognition	14.30 (10.53)
Educated	935 (32.48%)	Participation	3.00 (3.98)
Had sufficient income	2423 (84.16%)		

The model-fit statistics for the LPA models with one to four classes are presented in Table 2. The LMR-LRT showed that the four-class model was not significant, suggesting that the three-class model fit was better than the four-class model. In addition, the three-class model yielded a better model fit than the two-class model, because the values of AIC, BIC, and aBIC of the three-class model were lower than those of the two-class model. Given these model parameters, we selected the model containing three latent classes.

The parameters for the three-class model are presented in Table 3. The prevalence of the three latent classes and the average z-scores of each indicator were reported under each class. The most common class of healthy aging was a middle level of healthy aging (47.27%), characterized by moderate mean values on z-scores of ADLs, cognition, and participation. The second most common class was a low level of healthy aging (42.83%), characterized by the lowest average z-scores on all the indicators. The least common class was a high level of healthy aging (9.90%), characterized by the highest average z-scores on all the indicators. Overall, the above results supported the first hypothesis.

Unmet needs and healthy aging levels

Ordered logit regression analysis results

The regression model findings for unmet needs and healthy aging levels were summarized in Table 4. We used the "met needs" as the reference group in the regression analysis for healthy aging levels. To ease interpretation, we reported odds ratios for the independent and control variables. Compared to those with met needs for assistance, disabled older adults with unmet needs had a lower probability of achieving the higher level of healthy aging ($OR = 0.57$, $SE = 0.04$, $CI = 0.48–0.66$, $p < 0.001$), which supported the second hypothesis. Regarding control variables, disabled older adults, who were younger, married, better educated, lived in urban or eastern areas, received sufficient income, suffered from chronic illness, smoked, drank, took exercises, or received adequate healthcare services, had a higher probability of achieving a higher level of healthy aging.

Robust test

First, we conducted the Durbin-Wu-Hausman test to verify that endogeneity existed between unmet needs and healthy aging levels ($p < 0.01$). Second, using the provincial old-age dependency ratio as the instrumental variable, we conducted both the 2SLS model and the CMP model to check the robustness of the regression analysis results. Findings were summarized in Table 5, showing that disabled older adults with unmet needs experienced the lower level of healthy aging than their counterparts with met needs (2SLS: $b = -0.94$, $SE = 0.35$, $p < 0.01$; CMP: $b = -1.19$, $SE = 0.20$, $p < 0.001$).

Discussion

Existing research focused on the impact of unmet needs on the biomedical level of health. To our knowledge, this is the first study to measure healthy aging levels, and explore the

TABLE 2 Comparison of fit statistics for LPA models with one to four classes ($N = 2879$).

Number of Classes	AIC	BIC	aBIC	Entropy	LMR test (p)
1	24519.744	24555.535	24536.471	/	/
2	22457.536	22517.188	22485.415	0.861	0.0000
3	21569.226	21652.739	21608.256	0.862	0.0113
4	21177.401	21284.775	21227.582	0.883	0.5147

TABLE 3 Three-class model of healthy aging levels among Chinese older adults with disabilities ($N = 2879$).

	Low level of healthy aging	Middle level of healthy aging	High level of healthy aging
Latent class prevalence	42.83%	47.27%	9.90%
Item average z–scores (SE)			
ADL	−0.53***(0.03)	0.33*** (0.03)	0.77*** (0.03)
Cognition	−1.00***(0.02)	0.70*** (0.03)	1.06*** (0.04)
Participation	−0.50***(0.02)	0.002*** (0.05)	2.20*** (0.21)
Defining characteristics	lowest average z–scores on all the indicators.	moderate average z–scores on all the indicators.	highest average z–scores on all the indicators.

***$p < 0.001$.

TABLE 4 Summary of results from regression analysis of unmet needs and healthy aging levels among Chinese older adults with disabilities ($N = 2879$).

	Odds ratio (SE)	95% Confidence interval
Unmet needs	0.57*** (0.04)	0.48–0.66
Age	0.93*** (0.01)	0.92–0.94
Female	1.08 (0.10)	0.90–1.30
Currently married	1.35* (0.16)	1.06–1.71
Urban residence	1.26** (0.10)	1.08–1.48
Geographic area (East)		
Central	0.82* (0.08)	0.68–0.98
West	0.94 (0.10)	0.76–1.15
Educated	1.71*** (0.16)	1.42–2.05
Had Sufficient income	1.42** (0.16)	1.14–1.76
Had chronic illness	1.16 (0.10)	0.97–1.38
Smoked	1.78*** (0.26)	1.33–2.38
Drank	1.81*** (0.27)	1.33–2.44
Took exercises	3.85*** (0.47)	3.04–4.88
Had medical insurance	1.10 (0.11)	0.90–1.33
Received adequate healthcare service	1.51* (0.30)	0.97–1.38
R^2	0.14	
Chi^2	766.34***	

*P < 0.05, **P < 0.01, ***P < 0.001.

TABLE 5 Robust test of ordered logit regression analysis results ($N = 2879$).

	2SLS model		CMP model	
	b	SE	b	SE
Unmet needs	−0.94**	0.35	−1.19***	0.20
Control variables	Controlled			

P < 0.01,*P < 0.001.

relationship between unmet needs and different levels of healthy aging among Chinese older adults. Our results showed that most disabled older adults achieved the middle level of healthy aging while only < 10% achieved the high level of healthy aging, and that older adults with disabilities who experienced unmet needs for assistance had a lower probability of achieving the higher level of healthy aging than those with met needs.

Our study has implications for health research. Previous studies have established the relationship between unmet needs and a set of single health indicators which mainly represented the biomedical level of health, such as mortality, hospitalizations, rehospitalizations, and depression (11–17). Indeed, healthy aging comprises of physiological, psychological, and social domains. Therefore, more efforts are needed to explore the correlation between adequacy of LTC resources and overall health on a functional basis. This study is among the first to estimate the prevalence of Chinese disabled older adults experiencing different levels of healthy aging, which could set the basis for future studies to generate a harmonized index of healthy aging for international comparison. In addition, this is also the first study to understand the relationship between unmet needs for assistance and different levels of healthy aging. Since older adults with disabilities have complex health needs, a comprehensive measurement of healthy aging, rather than a single health outcome, could advance the knowledge on how the overall health would be affected by unmet needs, and it could set the basis for future studies to understand the relationship between unmet needs and the healthy aging index in aging populations.

This study highlights the need to take unmet needs for assistance as an indicator for assessing health needs and service quality. Although the Chinese LTC insurance pilot program has conducted a need assessment to identify older adults with severer disabilities as beneficiaries of publicly supported care, the disability criteria for benefit coverage typically overlooked the extent to which disability-related needs are met. Besides, evaluating the efficacy of LTC services is limited by the lack of appropriate outcome measures. Prior research indicated that more severe ADL limitations caused unmet ADL needs (19), which, in turn, might lead to a deterioration in healthy aging in this study, denoting the declining functioning of not only physical activities but also cognition and participation. And thus, a vicious spiral between unmet needs and declining functioning has been created, demonstrating the validity of unmet needs as an indicator for assessing health needs and service quality. Therefore, unmet needs could be a basis for risk assessment and a means for determining the efficacy of LTC interventions on maintaining health. If an older adult experiencing a met need changes to an unmet need, this might be a warning signal that the older adult is at a higher risk of losses in health. In contrast, if the changes occur in the opposite way, he or she is more likely to have ameliorated losses and achieve healthy aging.

This research increases the awareness of gerontological practitioners to the LTC services and supports for disabled older adults in China, which is shown to enhance their healthy aging in a developing country with the largest older adult population globally. Medical diagnosis and treatment, which are of high cost and require professionalism, have been the main means for maintaining health based on the traditional biomedical model. Compared to the single diagnosis and treatment that simply reacts to specific disease individually, LTC services can manage the complex needs of older age in an integrated way. Moreover, considering that the trajectory of functional decline is irreversible, LTC services will be more effective in not just delaying the process of decline, but ensuring disabled older adults have more opportunities for participation. And thus, the provision of sufficient and high-quality LTC services and supports for disabled older adults seems to be an effective intervention for improving healthy aging.

We note several limitations of this study. First, due to data restriction, this study was unable to examine the association between different types of unmet needs for assistance and healthy aging. Prior research identified differences between unmet needs for assistance with ADLs and IADLs (19), and also distinguished subjective unmet needs from objective unmet needs (55). Future studies could further explore different types of unmet needs for assistance and their influences on healthy aging if data become available. Second, our study is among the first to identify the latent class of older adults experiencing different levels of healthy aging by using three observed indicators, including ADLs, cognition, and participation. Future empirical studies are needed to add the social adaption and the age-friendly environments, another two fundamental indicators of healthy aging, to generate the latent classes of healthy aging. Lastly, our analysis included only community-dwelling older adults. Nursing home residents are, therefore, not represented in this analysis. Given the higher prevalence of functional impairment and other health problems in nursing home residents, our estimates of the percentage of older adults experiencing the low level of healthy aging are undoubtedly higher than their counterparts in nursing homes.

Data availability statement

Publicly available datasets were analyzed in this study. This data can be found here: https://opendata.pku.edu.cn/dataset.xhtml?persistentId=doi:10.18170/DVN/WBO7LK.

Ethics statement

The studies involving human participants were reviewed and approved by the Ethics Review Committee of Duke University and Peking University (IRB00001052e13074). The patients/participants provided their written informed consent to participate in this study.

Author contributions

YC and YL designed the study, edited the manuscript and supervised the data analysis. YC and YF drafted the first version of the article. YF performed all statistical analyses. All authors have read and approved the manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Development and validation of the care challenge scale in family caregivers of people with Alzheimer's disease

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Background: Alzheimer's disease (AD) is a progressive and debilitating disorder that strongly affects people with AD and their families. The changes in signs of the disease and its treatment lead to many challenges in people with AD that affect the performance and the ability of caregivers, their social life, and physical, emotional, and psychological aspects of caregivers' health. Therefore, this study was designed to develop and validate the Care Challenge Scale (CCS) for family caregivers of people with AD in the care context of Iran.

Method: This is a cross-sectional study, and the primary scale was based on 14 semi-structured interviews with family caregivers of Iranian people with AD. In the next phase, the psychometric features were assessed, including the face validity (qualitative and quantitative), content validity (qualitative and quantitative), item analysis, structural validity (exploratory and confirmatory factors), and construct validity (convergent and discriminant validity). Finally, the reliability was assessed using internal consistency (Cronbach's alpha, McDonald's omega coefficient, and the average inter-item correlation), stability (intraclass correlation coefficient), and absolute reliability.

Results: Totally, 435 Iranian family caregivers filled out online questionnaires, with a mean age of 50.26(±13.24) years. Based on the results of the qualitative phase, an item pool was generated with 389 items, and after deleting overlapping and unrelated items, the CCS with 14 items was created. The results of the quantitative phase showed that the CCS consists of two factors with 10 items each, which are named effective role-play challenge and lack of social–financial support, and they explained 42.23% of the total variance. Furthermore, the results of confirmatory factor analysis showed a good fitness of the scale structure model, and it had convergent and discriminant validity. The reliability indexes showed this scale has internal consistency and stability.

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Conclusion: The most care challenge among Iranian family caregivers of people with AD is effective role-play challenges and lack of social–financial support. The scale as designed has good validity, internal consistency, and stability that can be used by therapists, nurses, and researchers for the assessment of the challenges of this population.

KEYWORDS

family caregiver, Alzheimer, validity, reliability, challenge, scale, questionnaire

Introduction

Alzheimer's disease (AD) is a chronic, progressive, and debilitating brain disorder that is associated with profound effects on memory, intelligence, impairment in speech, motor activity, cognition, and general dysfunction (1). Alzheimer's Disease International (ADI) has reported that approximately 35.6 million people with dementia live worldwide in 2010, and this will double every 20 years; the prevalence will increase from 57.4 million cases globally in 2019 to 152.8 million cases in 2050 (2). Studies show the prevalence of dementia is influenced by cultural and socioeconomic factors and varies widely across countries. The increase in dementia is greater in developing countries, with 58% of people with dementia in developing countries, and this rate is projected to reach 71% by 2050 (3, 4). A study on AD in Iranian elders shows that there are more than 700,000 people with AD in Iran, that is, one of every 11.5 persons (5). It is estimated that 8 to 10% of the Iranian elders will be affected by this disease in the next two to three decades (6, 7).

These people become dependent on others to meet their needs due to cognitive and behavioral disorders, and this dependence on self-care increases over time (8, 9). Studies have shown that informal caregivers provide more than 81% of the care needed by patients with AD (10). In Iran, it is estimated that seven of 10 patients with AD are cared for at home (11, 12).

Inter-cultural studies show that the type of caregivers for these patients differs between Western and eastern countries (13). Iran, with a large number of people with AD, has two basic values, namely, altruism and strong family ties that result in greater commitment to relatives, especially if they are family members who experience an illness (14). In Asian countries, where community support services and resources needed by these people are lacking, families have become the first line of support (15, 16). Family members are forced to take full responsibility of caring for a person with dementia. While Western caregivers receive formal support. The Iran Alzheimer Association (IAA) is the only voice for people with various forms of dementia and is mainly engaged in the following activities: raising public awareness, clinical and rehabilitative activities, counseling, and education for patients and caregivers. As a result, the families and relatives are the main source of caring for these patients in Iran (14).

Since AD is a progressive and debilitating disorder, the people with AD and their families are constantly affected by the changes resulting from the disease and its treatment. These changes lead to challenges and needs that people with AD are affected with; thus, caregivers need to learn how to perform activities of daily living in people with AD (12, 17). The most important challenges that these caregivers experience during caregiving include physical, psychological, emotional, social, and financial challenges that, if not addressed properly, may lead to complications for the caregivers and the patients (16). Therefore, AD affects not only the patients but also the caregivers. According to the ADI, approximately half of the caregivers experience health, work, and social problems each year, which are referred to as "the caregiver burden" (18). Caregiver burden is defined as "a multidimensional response to the physical, psychological, emotional, social, and financial stressors associated with the care experience provided" (19). Caregiver burden is classified into the objective burden and subjective burden. The objective caregiver burden arises from spending time caring for and providing physical care to the patients such as helping the patients meet their personal needs and assisting with financial problems arising from care. While the cause of subjective caregiver burden in the caregivers is related to their perception of their ability to master dementia care, resource management, and gaining satisfaction from their caregiver role (9). This caregiver burden makes caregivers highly susceptible to a variety of problems. These problems include social isolation, deterioration in physical health, cardiovascular disease, mental health problems such as depression, lower levels of subjective wellbeing, anxiety, overuse of medication, and increased need for medical services (20). Many factors have been reported to affect the severity and amount of caregiver burden perceived by family caregivers of people with AD. These can be classified into two categories: patient-related factors such as disease severity, behavioral and psychological symptoms of dementia (BPSD), and disease duration, and caregiver community factors including kinship, gender, coping strategies, individual values and beliefs, community, culture, and the number of support resources available in the community (21–23). Individual values and culture greatly impact the motivation of caregivers to use resources or support and coping styles to care for people with AD, and as a result, the perceived intensity

and amount of caregiver burden felt and its complications may vary (24).

Research has shown that the challenges of family caregivers is the main factor that adversely affects functional, social, emotional, psychological, and financial aspects of caregivers (25). Therefore, prevention and reduction of the challenges of caregiving can significantly affect the caregivers. For this reason, a suitable scale is needed to quantify the important challenges that caregivers encounter.

Numerous tools have been developed to measure caregiver burden (26). One of the well-known tools primarily developed for assessing the burden on caregivers of people with dementia is the Zarit Burden Interview. It consists of 29 items and no subscale (27). Also, Taemeeyapradit et al. (28) developed a scale for assessing burden on caregivers of people with dementia with 18 items and three subscales (28). In Iran, Abdollahpour et al. (29) developed a Persian language caregiver burden scale based on a literature review and expert opinion for caregivers of people with dementia (29).

The causes of caregiver burden are physical, psychological, social, and financial and account for the majority of the challenges that these caregivers face. To our knowledge, most studies have focused exclusively on describing caregiver burden and side effects from the caregiver perspective but have not addressed the important challenges of the caregivers. However, the lack of an appropriate scale to measure main caregiver challenges during caring has resulted in the lack of quantifiable data. Since respect for elders is a very important value in Iranian culture and these caregivers do not have enough support services, they face many challenges while caring for people with AD. Therefore, the present study aims to develop and evaluate the psychometric properties of the Care Challenge Scale (CCS) in family caregivers of people with AD in the care context of Iran.

Methods

Design

A cross-sectional design was used to develop and validate the CCS in family caregivers of people with AD. A two-phase process was used: (1) the first phase (qualitative phase) consisted of semi-structured interviews with the target population for item generation, and (2) the second phase (quantitative phase) consisted of assessment of psychometric features of the developed scale.

First phase: Qualitative phase (item generation)

In order to clarify the concept of the main care challenges in the Iranian context based on the experiences of the target community, 14 semi-structured interviews were held with Iranian family caregivers. Their mean age was 54.57 years. The study was conducted between November 2020 and February 2021. Of the 14 participants, nine participants were daughters of patients, two participants were sons of a patient, and three participants were the spouse of patients. Their educational levels were as follows: eight had an academic education, four had diplomas, and two had elementary education. Overall, six participants were employed, and eight were not employed for various reasons such as retirement or leaving their job to care for a family member.

A purposeful and snowball sampling method was used to select these participants. The inclusion criteria in this phase were as follows: the family caregivers who were a member of the patients' family, friends, or relatives who were responsible for caring for the patients; family caregivers whose patients had moderate to severe AD and depended on caregiving for activities of daily living; and those who had the ability to express and recall their experiences. The interviews lasted between 30 and 90 min. Totally, 12 interviews were conducted at the clinic in one hospital in Tehran, and two interviews were conducted at the caregivers' homes. The sample size in this phase was based on data saturation (absence of new data). In this study, after 13 interviews, the data were saturated, and the last interview was conducted to ensure saturation.

The interview guide contained open-ended questions based on the study objectives, which were formulated after consulting the research team. Moreover, based on the data, exploratory questions were asked to the participants to deepen our understanding of their experiences. The interview guide is shown in Table 1. Examples of exploratory questions that were used to guide the interviews included the following: "Can you explain more about this?", "Can you give an example?", "When you say.... What do you mean?"

After each interview, the recorded interview was transcribed. The written text was carefully studied several times by the first researcher and coded using guided content analysis (30).

TABLE 1 Interview guide.

Introductory questions	How long has your elderly person had Alzheimer's disease? How long have you been caring for the patient? Can you talk about the care you gave to your People with Alzheimer's?
Challenge of caring	Have you ever been tired of caring? What bothers you about your care? What are the most important challenges you faced while caring?
Demographics	What is your marital status? Do you live with the patient? How old are you?
Final question	Do you have anything else to say about your challenges while caring from your patient?

In order to facilitate the coding process, we used MAXQDA software ver.10. At the end of this stage, 389 initial codes were extracted, and they were categorized into three themes. Based on the result of this phase and the extracted codes, an item pool of 389 items was created during frequent meetings of the research team, all of which were carefully studied. Duplicates, overlaps, and similarities of the items were checked, and some items were merged or deleted. Therefore, the total number of items was reduced to 50 and then to 14 items. Finally, the basic form of the CCS had 14 items with five-point Likert response options (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always) for the care context in Iran were designed based on the remaining codes. An electronic form of the questionnaire was created using Google Forms, and the data were collected online in different steps of psychometrics.

Second phase: Psychometric evaluation (item reduction)

During this stage, the initial scale was designed based on the qualitative phase and was evaluated in terms of the psychometric properties using face, content, and construct validity, as well as reliability. At each stage of the psychometric evaluation, inappropriate items were removed according to the criteria of that stage. The sample size at each stage was different (which is explained separately in each stage).

Face validity

Face validity was checked *via* qualitative and quantitative approaches. To perform qualitative face validity, 10 family caregivers were asked to evaluate items in terms of the level of difficulty or ambiguity in answering the questions, and based on their opinion, the items were edited by the research team. During quantitative face validity assessment, the impact score of each item was calculated by asking the same 10 family caregivers to assess the suitability of each item using a five-point Likert response (5 = it is completely suitable, 4= it is suitable, 3 = it is almost suitable, 2 = it is a little suitable, 1 = it is not suitable at all). The impact score formula included the following: the impact score = frequency (%) × suitability; an impact score of > 1.5 is considered acceptable (31).

Content validity

Like face validity, content validity was also evaluated using qualitative and quantitative approaches. In order to do qualitative content validity, we asked 12 experts (in nursing, psychology, instrument development, and gerontology) to assess each item. The content experts endorsed the items in terms of grammar, wording, item allocation, and scaling. Based on their opinion, some items were edited by the research team. During the evaluation of the quantitative content validity of the scale, the content validity ratio (CVR), content validity index (CVI), and modified kappa coefficient (K) were calculated. In the CVR, we asked the same 12 experts to evaluate how essential each item was using a three-point Likert response (1 = not essential, 2 = useful but not essential, 3 = essential), and an acceptable CVR was based on the Lawshe formula (21) (for 12 experts, it is 0.56) (32). At this stage, all of the items were acceptable (CVR > 0.56). In the CVI, we asked 11 different experts to evaluate the relevance of each item using a dichotomous response (1 = relevant, 0 = irrelevant). A chance effect was eliminated by calculating the modified kappa (K), where K > 0.74 was considered excellent, and a score of 0.60–0.74 was considered good (31).

Item analysis

Possible problems with the items before entering the construct validity stage were investigated using item analysis and calculating the corrected item total correlation. During this stage, at first, we designed the online form of the questionnaire and then we sent its link to 32 family caregivers (the mean age of participants was 52.02 ± 13.91). Items whose correlation coefficient was <0.32 between cases were deleted (31).

Construct validity

Participants

The sample was Iranian family caregivers such as family members, relatives, and friends of people with AD who provided care and was willing to participate in the study. Because the data were obtained using an electronic form of the questionnaire through social networks such as Telegram and WhatsApp, samples were selected if they were able to use these social networks. The sample size for a factor analysis study was based on the rule of thumb, that is, 10 subjects per item are considered suitable (31). Thus, the sample of 435 family caregivers was sufficient for the two stages [(210 for evaluating exploratory factor analysis (EFA) and 225 for evaluating confirmatory factor analysis (CFA)].

Measures

Data were collected at this stage in two parts. The first part included demographic characteristics such as age, sex, marital status, education level, employment, lifestyle (independent, living with a patient), and relationship to the patient. The second part included the CCS with 13 items and five-point Likert

response options (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always). The details of the production phases of CCS (reduction and creation) are shown in Figure 1. Data were gathered online and extracted into an Excel file. Therefore, the online questionnaire was created *via* Google Forms, and its URL link was sent to participants by email or through social networking applications such as Telegram channel or WhatsApp.

EFA, CFA, and convergent and divergent validity were used. At first, EFA was performed with the maximum-likelihood exploratory factor analysis (MLEFA) approach. EFA is a method for analyzing variance between several dependent variables based on their description in terms of a small number of latent variables (factors). EAF seeks to simplify complex data by describing them in terms of a smaller number of variables. EFA also allows for latent constructs to be better understood

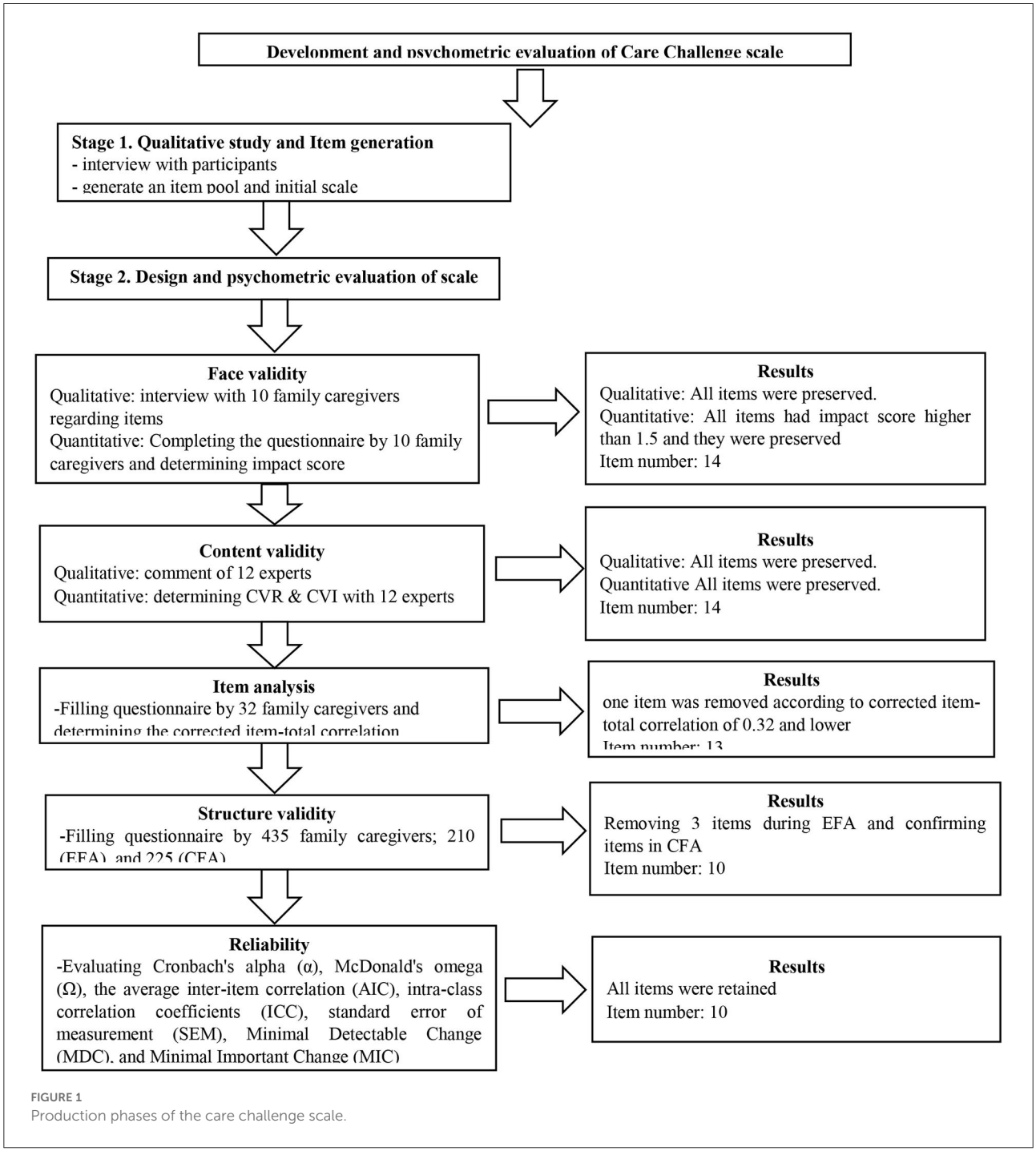

FIGURE 1
Production phases of the care challenge scale.

and explain more logically the items that reflect them (33). EFA assumed that there is a relationship and correlation between latent variables and a change in one latent variable affects another variable (33). The caring challenges is a concept in psychology and social sciences, and it seems that there is a relationship between its latent variables. Therefore, exploratory factor analysis was used in this study.

In psychological studies, as long as there is no strong evidence that there is no relationship between the latent factors, it is recommended to use the oblique rotation method to extract the factors. In social sciences, it is expected that there are relationships between factors. Therefore, if the factors are related, the orthogonal rotation will cause a loss of valuable information (31). Therefore, the oblique rotation method was used in this analysis.

In order to evaluate the quality of responses and the quality of the samples, the Kaiser–Meyer–Olkin (KMO) and Bartlett's tests were calculated. The KMO values higher than 0.9 were interpreted as excellent. The number of suitable extraction factors was determined using Horn's parallel analysis and the exploratory graph analysis approach (31), where a value of 0.3 was set for the correlation between the factors. Promex rotation is the most common rotation used in humanities, and it is used to insert specific items for each factor. Horn's parallel analysis provides more accurate results for determining the number of main scale factors. It creates a random score matrix that has exactly the same rank and type of variables as is in the data set. Comparison of the actual values of the randomly generated matrix determines the correct number of factors and has more variance than the components of the random data (34).

The number of items for each latent factor was determined by accounting for the factor loading. The factor loading formula included the following: $CV = 5.152 \div \sqrt{(n = 2)}$, where CV is the number of extractable factors, "N" is the sample size, and a factor loading of 0.36 is acceptable for retaining the item in the factor (33).

The factor structure obtained by EFA was examined by CFA. The maximum-likelihood method was also used. The most common goodness-of-fit indicators of the proposed model were based on their accepted threshold using the chi-square (χ^2) test, chi-square/degree-of-freedom ratio (χ^2/df) < 4, comparative fit index (CFI) >0.90, incremental fit index (IFI) >0.90, normed fit index (NFI) >0.90, Tucker–Lewis index (TLI) >0.90, relative fit index (RFI) >0.90, root mean square error of approximation (RMSEA) <0.08, Parsimonious Normed Fit Index (PNFI) >0.50, and Parsimonious Comparative Fit Index (PCFI) >0.50 (33).

Convergent and discriminant validity

Convergent and divergent validity of the structure were measured by Fornell and Larker's (35) approach (35) based on the following parameters: the average variance extracted (AVE), maximum shared squared variance (MSV), and composite reliability (CR). To confirm convergent validity, AVE must be > 0.5 and CR > AVE. To confirm divergent validity, MSV must be < AVE (36). Furthermore, discriminant validity was evaluated using a new approach, the heterotrait-to-monotrait ratio (HTMT) criteria. A value of <0.85 was considered evidence of discriminant validity (36).

Reliability

Cronbach's alpha, McDonald's omega coefficient (Ω), and the average inter-item correlation (AIC) were used to determine the internal consistency of the scale. Therefore, the coefficient's α and Ω values >0.7 and AIC between 0.2 and 0.4 were considered acceptable (37). Also, CR and maximum reliability (Max H) >0.7 of the structural education model were used as criteria to determine reliability (37). The intra-class correlation coefficients (ICCs) were used to determine the stability with a two-week interval in 30 family caregivers (38). Furthermore, the absolute reliability was evaluated using the standard error of measurement (SEM) using the following formula: (SEM = SDPooled $\times \sqrt{1}$ – ICC). Finally, the responsiveness and interpretability of CCS were evaluated by counting the minimal detectable change (MDC) using the following formula: MDC95 = SEM $\times \sqrt{2} \times 1.96$; the minimal important change (MIC) was calculated using the following formula: MIC = 0.5 × SD of the Δscore, respectively, and ceiling and floor effect.

Multivariate normality and outliers

Univariate and multivariate outliers were evaluated using distribution charts and Mahalanobis distance $p < 0.001$. Furthermore, univariate normality and multivariate normality distributions were checked by skewness (±3), kurtosis (±7), and Mardia's coefficient (>8), respectively (39).

Data analysis

Data were analyzed using $SPSS/AMOS_{26}$, $SPSS\ R\text{-}Menu_{2.0}$ and $JASP_{0.16.2.0}$.

Ethical consideration

The Ethics Committee of the Mazandaran University of Medical Sciences assessed the protocol of this study and approved the study (IR.MAZUMS.REC.1401.13880). Ethical points observed in the item generation phase were as follows: (1) assuring participants that their information is confidential and (2) obtaining written and oral permission from participants for audio recording. In the validation stage of the scale, the necessary information of the study including the purpose of the

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TABLE 2 Demographic characteristics of participants ($n = 435$).

Variables	Mean±SD
Age	50.26±13.24
Average h of care per day (h)	7.51 ± 5.51
Duration of the disease (year)	4.65 ±2.52
Sex *n* (%)	
Female	220 (50.6)
Male	215 (49.4)
Marital status	
Single	92 (21.1)
Married	299 (68.7)
Divorced	14 (3.2)
Widow	30 (6.9)
Education level	
Illiterate	11 (2.5)
Less than diploma	30 (6.9)
Diploma	200 (46)
Academic	194 (44.6)
Employment	
Unemployed	42 (9.7)
Employed	161 (37)
Housewife	146 (33.6)
Retired	24 (5.5)
Not employment	62 (14.3)
Lifestyle	
Independent	262 (60.2)
With patients	173 (39.8)
Relationship with the patient	
Daughter	230 (52.9)
Son	57 (13.1)
Wife	37 (8.5)
Husband	20 (4.6)
Friend	34 (7.8)
Relative	57 (13.1)

study, the code of ethics of the study, the number of questions, and the characteristics of the research was mentioned in the first part of the online questionnaire form.

Results

Demographic characteristics of participants

During construct validity, 435 family caregivers, with a mean age of 50.26 (±13.24) years, participated. Most of them were female (50.6%) and married (68.7%). The details of demographic characteristics are given in Table 2.

Item generation

An item pool was generated with 389 items after deleting overlapping and unrelated items; the CCS with 14 items and a five-point Likert response (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always) was created and entered to the next phase.

Item reduction

Based on the result of the impact score, CVR, and modified kappa (K), no items were removed. During the item analysis step, one item was removed, and the CCS with 13 items was entered into the factor analysis step.

Construct validity

The adequacy and suitability of the sample were confirmed based on the results of KMO (0.841) and Bartlett's value of 756.401 ($p < 0.001$). In EFA with Promax rotation, 10 items remained, and they were classified into two factors, namely, F1: with five items, and F2: with five items. These two factors explained 42.23% of the total variance of care challenges in family caregivers of Alzheimer's patients. The details of the results of this step are given in Table 3, Figures 2, 3. The model extracted in EFA was evaluated during CFA, and the results showed this model had good fit indices. Details are provided in Table 4, Figure 4.

Based on the results of AVE and CR, the first factor had the convergent and discriminant validity, but the second factor did not have these features. It is noteworthy that based on the result of HTMT, two factors had discriminant validity (Tables 5, 6).

These two factors had acceptable internal consistency based on results of Cronbach's alpha, McDonald's omega coefficient, and AIC. The details of these results are shown in Table 4. Also, the ICC score was 0.90, indicating that the scale has strong stability. The absolute reliability was ±2.23, and based on results of MDC, MIC, LOA, ceiling, and floor effects (items were free of these effects), this scale had responsiveness and interpretability features (Table 7).

Discussion

This study was designed and then evaluated for its psychometric properties using the CCS in family caregivers of people with AD. The results showed that the self-report CCS in family caregivers of people with AD had good reliability and validity. The scale presents both general and context-specific challenges that the caregiver face. In

TABLE 3 Result of EFA on the two factors of CCS ($n = 210$).

Factors	Q_n. item	Factor loading	h^2	λ	%Variance
Effective role play challenge	11. It is difficult for me to control my patient's unusual behaviors.	0.976	0.879	2.350	23.50
	12. It is difficult for me to control my patient's anxiety and worry.	0.891	0.727		
	5. I do not have the ability to communicate properly with the patient.	0.489	0.309		
	13. Due to my patient's unusual behaviors, I have to control his/her social interactions.	0.437	0.448		
	10. Not having enough information about how to care for a patient puts more pressure on me.	0.417	0.428		
Lack of social - financial support	7. The lack of insurance for some aspects of treatment puts me under pressure.	0.857	0.633	1.873	18.73
	6. Taking care of the patient is costly for me.	0.712	0.496		
	9. The lack of proper support centers in the community increases the pressure on me.	0.514	0.433		
	8. Not cooperating those around me increases the pressure of caring for me.	0.450	0.287		
	3. Patient care has affected my job.	0.407	0.207		

* h^2, communalities; λ, eigenvalue.

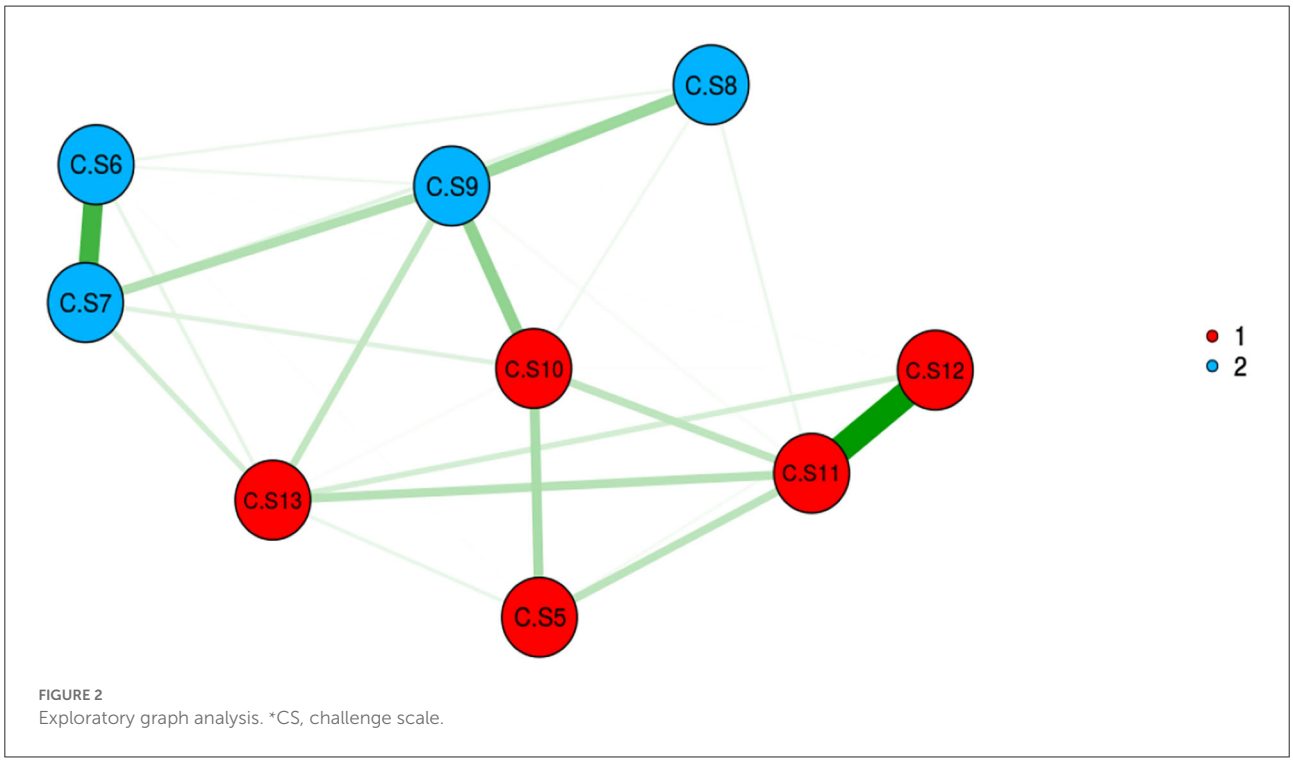

FIGURE 2
Exploratory graph analysis. *CS, challenge scale.

Iran, Abdollahpour et al. (29) developed a questionnaire to assess the caregiver burden for caregivers of people with dementia, based on literature review and expert opinion. They assessed the content validity and reliability (29). The present study was carried out because of the lack of a valid and reliable tool according to Asian and Iranian cultures. Having context-based information is essential for designing interventions to reduce stress and promote the wellbeing of family caregivers (40).

After designing and assessing face and content validity, a 10-item two-factor structure questionnaire was developed based on exploratory factor analysis. Factor 1 (effective role-play challenge) included items concerning difficulties related to communication with the patients, control of unusual behaviors,

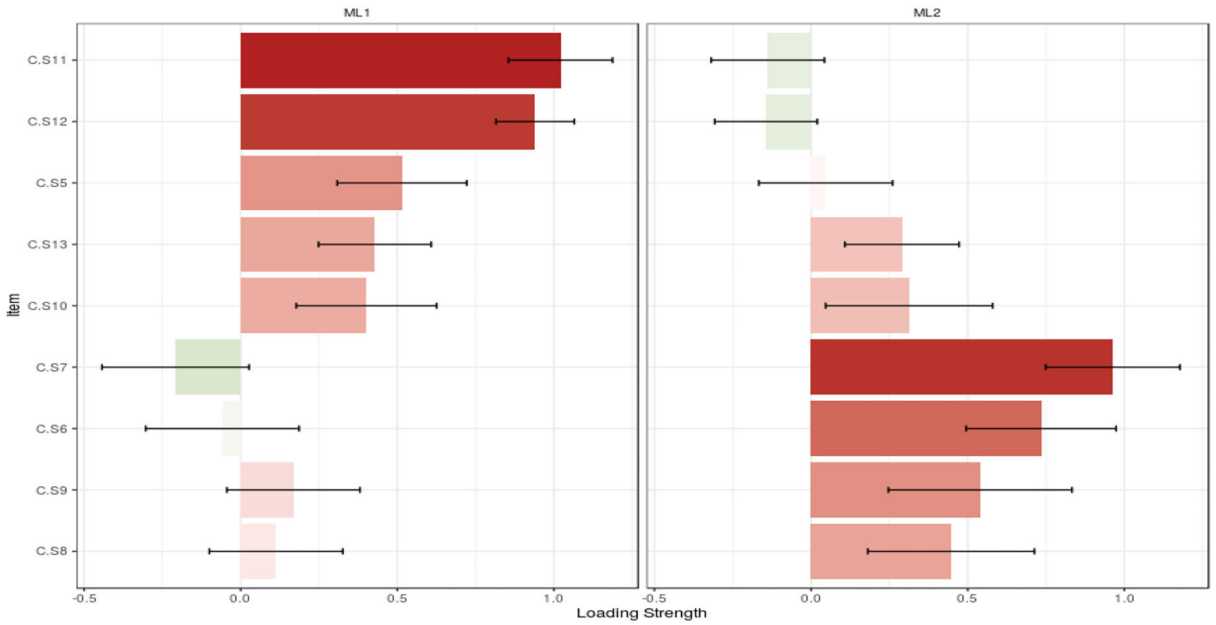

FIGURE 3
Loading strength of items in factors. *ML1, maximum-likelihood factor 1; ML2, maximum-likelihood factor 2.

TABLE 4 Fit indices of the CFA model after structure modification of the CCS ($n = 225$).

CFI	IFI	TLI	PCFI	RFI	NFI	PNFI	RMSEA	CMIN/DF	*P*-value	Df	χ^2	Indices
0.929	0.930	0.903	0.681	0.851	0.891	0.653	0.042	2.565	<0.006	33	44.661	CFA model

DF, degree of freedom; PCFI, Parsimonious Comparative Fit Index; PNFI, Parsimonious Normed Fit Index; CMIN/DF, minimum discrepancy function divided by degrees of freedom; RMSEA, root mean square error of approximation; TLI, Tucker–Lewis Index; and CFI, comparative fit index, IFI, incremental fit index.
Fitness indexes, PNFI, PCFI (>0.5). TLI, IFI, CFI, NFI, RFI (>0.9), RMSEA (<0.08), CMIN/DF (<3 good, <5 acceptable).

patient anxiety, and lack of information. This dimension focuses on the proper performance of the caregiver with respect to people and care situations. It assesses the challenges that caregivers are faced with in solving problems related to the patients' behaviors and the ability to manage symptoms of the patients. Therefore, this domain seems to be related to the caring ability of the caregivers (41). The second factor (lack of social–financial support) has items concerning the cost and supportive challenges for managing and caring for patients with AD such as lack of insurance coverage, loss of job while providing care, lacking cooperation from relatives, and lack of social support. All these factors expose the caregivers to challenges. This dimension is related to the financial burden that caregivers face during the caregiving process and the lack of social and formal support.

The caregiver burden questionnaire developed by Abdollahpour et al. (29) has 33 items and no subscale. The present study has similarities in terms of difficulties with patients' behaviors and the support of others. Our questionnaire includes considerations about job threats, insurance coverage, and limited social support, which were not included in the questionnaire by Abdollahpour et al. (29). The cost of care and the limited coverage of insurance, facilities, and support are more significant for Iranian caregivers of people with AD than other caregivers in other developing countries (28). Many tools on caregiver burden originate from developed countries and do not focus on these important issues. Because the questionnaire of Abdollahpour et al. is based on a literature review, it is reasonable that the financial issues are addressed only by one item in their questionnaire, and social support and insurance coverage were not included.

Gerritsen and Van der Ende developed a scale to measure the caregiving burden in the spouses of patients with dementia, which includes 13 items and two dimensions of "relationship" and "personal consequences" (42). Their scale and the CCS both address the difficulty of communicating with the patients, but the scale of Gerritsen and Van der Ende also addresses issues such as the caregivers' health, lack of personal time, and feelings of depression, anger, frustration, and embarrassment about the

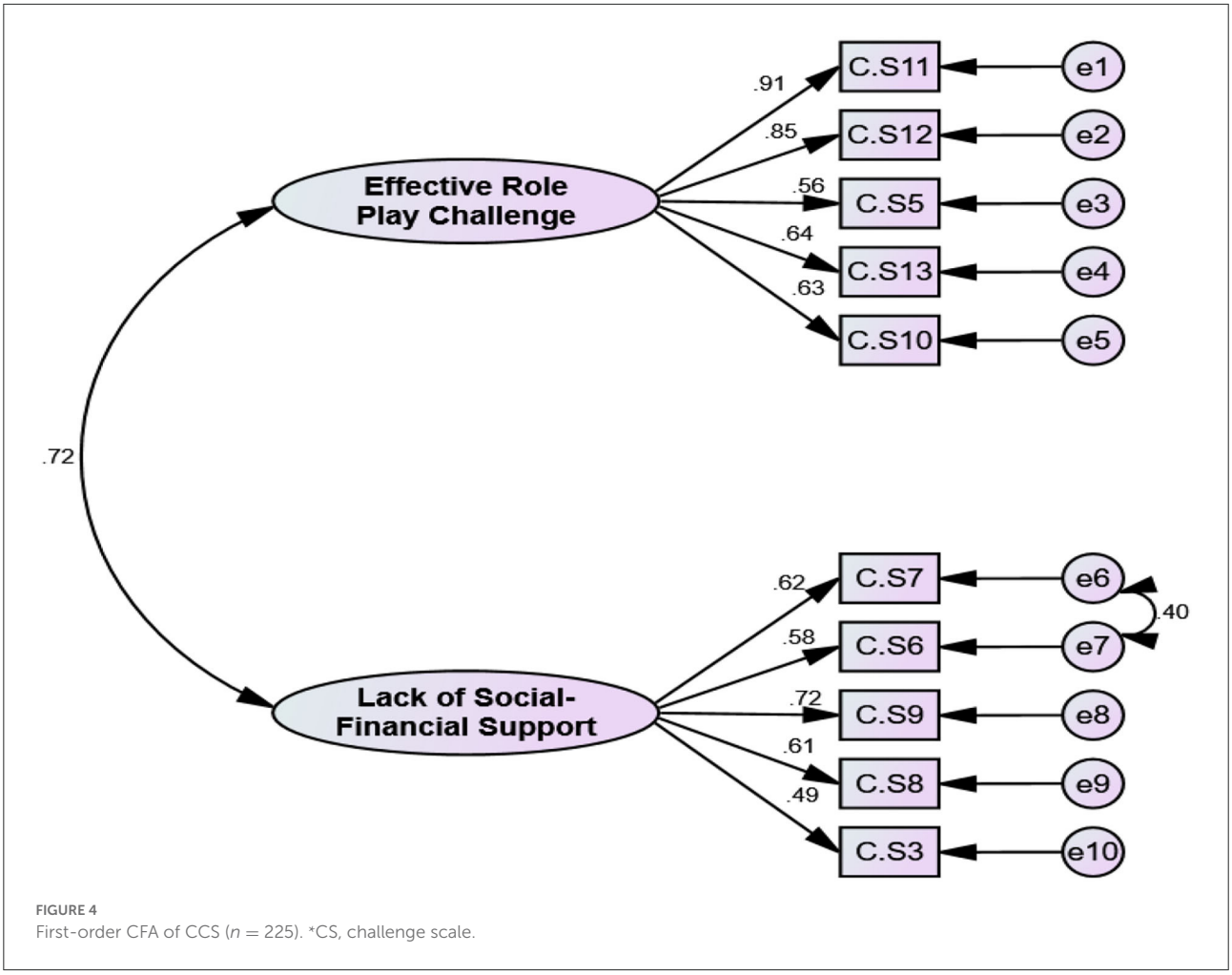

FIGURE 4
First-order CFA of CCS ($n = 225$). *CS, challenge scale.

TABLE 5 Indices of the convergent, discriminant validity, and internal consistency of CCS ($n = 225$).

Index / factor	CR	AVE	MSV	MaxR (H)	Alpha	Omega	AIC
Effective role play challenge	0.848	0.537	0.513	0.905	0.838	0.837	0.515
Lack of social - financial support	0.745	0.372	0.513	0.758	0.765	0.773	0.393

DF, degree of freedom; CR, composite reliability; AVE, average variance extracted; MSV, maximum shared squared variance; AIC, average inter-item correlation.

patients. These items are not present in the CCS. On the other hand, our tool addresses topics such as lack of information about care, the threat to job security, and the limitation of financial and social support, which were not included in Gerritsen and Van der Ende's study.

One well-known caregiver burden assessment tool, which was first developed for people with senile dementia, is the Zarit Burden Interview. Similar to the present questionnaire, the original version of this tool has 29 items and no subscales and covers issues such as support of relatives and others, embarrassing behaviors of the patients, and the cost of care (27). Still, aspects such as social support, insurance issues, and knowledge deficit of the caregivers about how to care are included in the present questionnaire, which were not addressed in the Zarit Burden Interview. In another study, Taemeeyapradit et al. developed a caregiver burden scale for patients with dementia based on literature review, interviews, and expert opinion in Thailand (28). Their scale has 18 items

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TABLE 6 Results of HTMT of CCS ($n = 225$).

Dimensions	Effective role play challenge	Lack of social - financial support
Effective role play challenge		
Lack of social - financial support	0.765	

TABLE 7 Results of stability, SEM, responsiveness, and interpretability ($n = 30$).

	ICC	SD	Mean	SEM	MDC 95%	MIC	LOA
Scale	0.902	7.13	32.46	2.23	6.18	3.56	46.43–18.48

with three physical, psychological, and financial burden factors. The financial burden of care, lack of cooperation of others and relatives as caregivers, difficulties in communication with people and management of their behaviors, and lack of information and social support are similar to our CCS and to the scale by Taemeeyapradit et al. These extensive similarities may be due to the cultural similarities of the caregivers participating in both studies. But in our questionnaire, the caregivers' threat of losing their job was addressed, which was not included in the scale by Taemeeyapradit et al.

Conversely, the Zarit Burden Interview (27) and the Thai caregiver of people with dementia burden scale (28) include items concerning anxiety and depression, which were not included in our questionnaire. Some studies showed that Iranian caregivers of people with AD and dementia experience low to moderate anxiety and depression (43, 44). Also, since the purpose of this scale was to identify the challenges of caregivers and not the burden of care, the participants were more likely to point out the factors that led to the challenge in the qualitative stage; thus, the final scale did not have items about anxiety and depression.

Some contextual and cultural issues influenced item generation in this study. In Iran, like in many other developing countries, there are no formal institutions to support family caregivers. Also, community-based client care programs are in their infancy, and most care tasks for patients with AD are the responsibility of the patients' family, even if they do not receive special financial support (45). On the other hand, in Iranian and Eastern cultures, caring for a family member is one of the important values. Spouses and children are obligated to care for their relatives, even if they are not in a good financial situation or do not have sufficient facilities. Therefore, many of the items in our questionnaire focus on financial issues and social support to help identify the challenges faced by family caregivers in countries with low and moderate financial and social support systems.

Implication

This scale can be used in research studies to assess and quantify the level of challenges in caregivers and can also be used to evaluate the effectiveness of various interventions that are aimed at decreasing the challenges faced by caregivers of people with AD. The CCS can identify where the support is most needed and who needs the support. Additionally, the CCS can also provide insights into which challenges are most frequently faced by the caregivers.

Study limitation

This study has some limitations. Since the majority of the participants in this study were daughters of patients, and the real composition of caregivers in Iran is unknown, the generalization and representativeness of the findings could potentially be an issue. Another limitation of this study was related to the questions of the interview. Since the purpose of this study was to understand the family caregivers' challenges, the questions may have only led participants toward negative aspects of care, and they may have only remarked on problems in their care, while some caregivers may be satisfied with the care they provide and find caring for a loved one rewarding. It is a limitation that this aspect of caregiving was not captured. Another limitation of this study is the close relation between care burden and care challenge. Therefore, we suggest further testing of the relationship between the newly developed Care Challenge Scale and care burden among family caregivers of people with dementia to show the theoretical relevance.

Study strength

The salient strength of this study is the application of Horn's parallel analysis and the exploratory graph analysis approach for the determination of factors. The final scale had 10 items, and because of the limitations that caregivers face, such as the limitation of time, a brief scale is ideal for assessing their challenges. The assessment of convergent and discriminant validity, calculation of McDonald's omega coefficient other than Cronbach's alpha, and evaluation of absolute reliability by calculation of standard error of measurement (SEM) are additional strengths of this study.

Conclusion

This study showed that family caregivers of people with AD have two main challenges including the inability to carry out their caregivers' role effectively and a lack of financial and emotional support. Furthermore, the CCS has good validity and internal consistency and can reliably be used by healthcare

professionals and researchers for evaluating family caregivers' challenges when designing and evaluating effective interventions to reduce their challenges.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Mazandaran University of Medical Sciences Research Ethics Committee (IR.MAZUMS.REC.1401.13880). The patients/participants provided their written informed consent to participate in this study.

Author contributions

HS, LH, and MA contributed to the conceptualization and design of the study. LH collected the data. HS and LH analyzed and interpreted the data. HS, LH, MA, ES, and SH prepared the manuscript draft. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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How the interrelated physical, social and organizational environment impacts daily life of residents with dementia on a Green Care Farm

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Green Care Farms (GCF) are innovative long-term care environments and an alternative to regular nursing homes in the Netherlands. Following a culture change movement, GCFs have radically altered the care environment. Research suggests positive effects on residents. However, knowledge is limited regarding their physical, social and organizational environment. This article explores the care environment of 24-h GCFs for people with dementia and its impact on residents and their daily life. An ethnographic study using mixed methods was carried out at a GCF in the Netherlands between June and October 2021. Researchers lived on the GCF and completed 28 days of participatory observations in three groups. During the day, informal conversations were held with residents (n = 48), staff and family members. Twenty four semi-structured interviews were conducted with residents, their family members, staff and the managers, complemented by a focus group with staff. The physical environment was additionally assessed with the OAZIS-dementia tool. Data collection methods informed each other. Qualitative data was thematically analyzed, quantitative data descriptively. Four themes were identified as crucial during daily life on the GCF: stimulating the senses, engaging in purposeful activities, sharing responsibilities and creating a community in a new home. Realizing these topics in practice, physical, social and organizational environmental components were highly interrelated. The physical environment encouraged and facilitated meaningful in-/outdoor activities and social encounters. The organizational environment supported the use of the physical environment by aligning processes and transporting the vision. The social environment focused on collaboration and creating a home-like atmosphere by including residents in household- and farm chores. This community-building led to more meaningful activities and social interaction. In conclusion, this study revealed the central influence of the management in paving the way for a new form of care delivery. As leaders shape the three environments, the organization influences the design of the physical environment and the actions taking place within it. By creating a community,

the care home benefits residents, their families and staff equally. The conscious interrelation and harmonization of the physical, social and organizational components of a long-term care environment has the potential to improve the daily life of residents.

KEYWORDS

dementia, innovative nursing home, long-term care, Green Care Farm, leadership, residents, meaningful activities

Introduction

Due to the continuous aging of the Western societies, age-related diseases are on the rise, especially neurodegenerative conditions like dementia (1, 2). The simultaneous increase in care demands and decrease in human and financial resources calls for a different approach of organizing care and support for those in need of long-term care (3, 4). Traditional long-term care facilities are often based on a medical understanding of long-term care (5). Evidence suggests high levels of inactivity (6) and neuropsychiatric symptoms (7), as well as a high use of psychotropic drugs (8) in people living in traditional long-term care facilities. Following a culture change in long-term care, innovative concepts have been introduced, delivering care to vulnerable older people in smaller, more home-like environments than traditional larger long-term care facilities. Based on a more psychosocial understanding of long-term care, care is evolving around autonomy, maintaining daily functioning and sustainably engaging in meaningful activities with a focus on well-being (9).

One of these innovative initiatives are Green Care Farms (GCF), which are among the fastest growing forms of multifunctional agriculture (10). GCFs not only employ a different care vision, they also actively incorporate natural activities into the daily life. Examples include caring for animals, working in the garden, or cooking with homegrown vegetables (11, 12). The care focuses on stimulating self-reliance and offering a meaningful daytime activity, which might help people with dementia to stay active for a longer time (13). Research also indicates that residents at GCFs are more active than residents in traditional settings and are more physically and socially engaged during activities carried out (14). Furthermore, studies have found positive effects of day care at GCFs on dietary intake of people living with dementia (15). These positive effects can be linked to the radically different care environment of GCFs.

The care environment plays a crucial role in the progress of people with dementia and can both hinder or support their physical, mental and social functioning (16). Each care environment has physical, social and organizational features, each influencing the way, care is delivered (13). The physical environment is the tangible environment with natural and human-made objects. It can be a barrier or an enabler for people (17). The built environment can support purposeful activity and quality of life, especially for people with dementia (18, 19). Examples include the design of the indoor and outdoor environment, the privacy of rooms or the furnishing of communal areas. The social environment describes the social setting in which people live or act (20). It is comprised of human contacts, stimulation, activities (21), but also the larger cultural values (22). An example is relationship-centered care, which aims to involve the social network of a person into care (23). Lastly, the organizational environment describes not only the structure of an organization, but also the processes (24). A structural element could be the division of tasks, while rules or routines that guide staff actions are company-specific processes. Shared values and a supportive leadership, for example, have been found to improve the delivery of care (25).

Alternative care concepts like CGFs have radically changed the physical, social and organizational environment to better meet the needs of residents, their family members and staff (13). They are part of a culture change movement toward more suitable living environments for people with care needs and a more age-friendly society. By providing care focusing on the person and their relational context, not the disability, such concepts can provide other, more traditional care facilities with valuable insights on how to rethink dementia care. Traditional care organizations aiming to redesign their care delivery often face difficulties in implementing change [e.g., (26)]. Bound to existing buildings, but also routines and regulations, the implementation of a new vision on care often proves to be challenging (27). Therefore, practical knowledge is needed on innovative care environments such as GCFs, providing other care organizations with examples on how to sustainably and successfully implement changes that benefit all stakeholders involved. Although GCFs are becoming a more prominent alternative to regular care, there is little knowledge on the underlying components and working mechanisms of this innovative care environment. Therefore, the aim of this study is to analyze the care environment of GCFs based on their physical, social and organizational context.

FIGURE 1
Illustrative images of the Dutch Green Care Farm "ZorgErf buiten-verbijf".

Methods

Design

An explorative, mixed-methods ethnographic case study was conducted between May 2021 and October 2021. Aiming to understand the way in which care is delivered at GCFs, as well as opinions and experiences of involved stakeholders, this study took a constructivist perspective (28).

Setting

The study took place at the privately owned GCF "ZorgErf buiten-verblijf" in the Netherlands, newly built in 2014 (see Figure 1 for illustrative images). ZorgErf is officially registered as care home, focusing on people with dementia only. Admission is based on official Dutch regulations considering the care dependency level. The care, to which a person is entitled to, is determined by a standardized procedure, carried out by a government agency (29).

The GCF is located in the countryside, not far from a small city. It has 48 rooms available for people living with dementia, which are organized in three groups. In each group, 16 residents live in small houses accessible through a garden surrounding a large common house. Each common house has two living rooms and a kitchen on the ground floor, and an office, as well as a small meeting room on the first floor. The entire common house is furnished in a homelike manner, often with furniture and art from residents themselves. The groups are mostly self-organized regarding daily life. This includes for example the planning, ordering and preparing of all meals or the determination of the daily activities and the time-schedule. The GCF has an open-door policy, allowing residents to freely access the entire 3-acre location. Here, they can visit vegetable gardens and several animals such as chicken, horses, pigs or sheep. The facilities include a country house, where various events take place and a café with a large terrace is included. Furthermore, a day-care for around 30 guests per day is part of the location; however, it was not focus of this study.

During the time of the study, the staff of each group consisted of registered nurses, certified nurses, nursing assistants and hostesses. During daytime, two care staff members and one hostess were permanently present in each group, supported by two shorter stays of hostesses during midday and the evening. At night, two care staff members were present for the entire location. Often, interns or volunteers supplemented staffing levels, and during times of more complex care situations, more staff hours were possible.

Data collection

All data was collected from June 2021–October 2021. Four types of data collection methods were used, namely ethnographic participatory observations, including informal conversation as well as field notes, interviews, a focus group and a quantitative assessment of the physical environment. The observations formed the basis for the other methods, helping the researcher to get familiar with the setting. Data collection methods informed each other, allowing the validation of insights from different perspectives.

Ethnographic observations

To understand the daily life on the GCF and immerse in the setting, the first author, KR, lived at the GCF between June 2021 and August 2021, residing in a small house on the location. In total, 25 days of ethnographic participatory observations were undertaken by the first author. One of the team members, SS, completed an additional three days of observations to help discuss ideas and validate findings. In each of the three housing groups, three weeks were spent. During each week, two to three randomly chosen days were observed. Usually, observation periods lasted for 5 h, either during the morning (07:00–12:00), during the afternoon (12:00–17:00) or during the evening (17:00–22:00). In addition, one night shift (22:00–05:00) was observed. The goal was to get an overview of the life on the GCF. Observing actions and having informal conversations have been described as valuable tools to get insights into the habitual practice and can be more valuable than asking participants what they would have done in a certain situation (30). A few weeks prior to the start of the project, the first author was introduced via e-mail and posters hanging in each group. Before starting observations in a new group, the first author was personally introduced by the manager. The following observations usually started with a tour to get a sense of the daily life and the atmosphere (31). Afterwards, specific situations were chosen which seemed to be key moments during the day on the GCF. This could be mealtimes, indoor and outdoor activities or care- and other routines. Gradually, the first author became a part of the daily life at the GCF, working along the staff members. Informal conversations with residents, their visiting family members, staff members and volunteers were held in order to understand perspectives, opinions and lines of reasoning. During the observations, field notes were taken, helping to remember details observed during the day. Soon after, they were expanded into more elaborate notes. These included a physical description of where the observed situation took place, of the people participating, of the situation itself, including the role of each participant as well as conversations, and personal impressions about the atmosphere (32, 33). The field notes were regularly discussed within the team to determine potential follow-up moments to observe or questions to ask.

Interviews

As second part of the data collection, the first author held semi-structured interviews to get insights into the discourse at the GCF. In total, 24 interviews were held, with one interview including two participants. They were deliberately done after some weeks of observations and were informed by first insights gained there. They added more detailed opinions, reflections and background information than possible to gather during informal conversations during the ethnographic observations alone. From each of the three groups at the GCF, at least two residents, two family members and three staff members were interviewed. Additionally, other actors such as volunteers or activity coaches were included. Participants were purposefully sampled to reach maximum variation in demographic characteristics, relationship to the resident or functions. The first author invited them to participate after the first three weeks of participatory observations. After agreeing, a date for the interview was planned, where also the informed consent was signed. The baseline data of the participants is displayed in Table 1. Most of the interviews took place at the GCF, in various quiet locations chosen by the participant. Three interviews were held online. With residents in particular, the interviews were held in a relaxing atmosphere, for example while drinking a coffee in the private room. The interview guide for each participants group was developed after completing two weeks of ethnographic observations. First experiences and informal talks with the people met on location helped to identify relevant questions. The research team provided feedback for each interview guide. Questions were openly formulated and targeted, depending on the participant group, topics such as: "What do you like to do here during the day?", "How would you describe your relationship with the residents here?" or "What is most important in the life of your relative?" Follow-up questions were asked to get a holistic and in-depth understanding of the participant's perspective. The interviewer stepped away from the interview guideline in case topics were identified which seemed especially important to the participant. The interviews lasted between 22 and 110 min and were audiotaped.

Focus group

As third part of the data collection, a focus group was held with staff members in October 2021, after the ethnographic observation period. All staff members were invited by e-mail to join the focus group, which was planned for 2.5 h. The focus group was divided into three parts, starting with a short introduction. Thereafter, the staff members were invited to collect their favorite moments or activities during their work in a brainstorm session in smaller groups. After discussing results with the entire group, the staff members were again asked to come together in their groups. This time, they collected physical, social and organizational elements necessary to experience or do these moments. This was seen as a way to identify what

TABLE 1 Baseline characteristics of interview participants.

Participant baseline characteristics	*n* =	Mean	SD	%
Total	25			
Residents	6			
Age in years		86.17	2.91	
Women	5			83.3%
Family caregivers	7			
Age in years		61.57	9.96	
Women	5			71.4%
Relationship with resident				
Child	6			85.7%
Spouse	1			14.3%
Staff	12			
Age in years		50.33	12.43	
Women	10			83.3%
Level of education				
Ongoing education	1			8.3%
Baccalaureate-educated registered nurse	4			33.3%
Vocationally-trained registered nurse	3			25.0%
Certified nurse assistant	1			8.3%
Nurse assistant/aide	3			25.0%
Months employed at location		63.58	48.53	
Months working in function		89.58	121.26	
Years working in care		17.19	14.94	
Working hours per week		25.21	10.22	

is most important for employees on a GCF and the key components necessary for the functioning of this innovative care environment. A discussion leader, who steered the brainstorm and could ask further questions, led each group. The discussion leaders ($n = 2$) were members of the university, either directly involved in the present project (BdB) or involved in similar projects and carefully instructed. To capture the thoughts and ideas of the participants during the brainstorm sessions, the groups were provided with pens and large papers. During the focus group, the discussion leaders took notes about the conversations in the brainstorm sessions, which were converted into more extensive notes later. The notes that the staff members of each of the groups took during the session were photographed and digitalized by the first author afterwards. Additionally, the first author wrote a summary of the focus group, describing the key takeaways and the atmosphere.

Quantitative assessment tool

Lastly, the physical environment was assessed with the OAZIS-dementia tool, which was developed in 2015 for the Dutch long-term care setting (34). It consists of 72 items in the seven categories privacy and autonomy, sensory stimulation, view and nature, facilities, orientation and routing, domesticity, as well as safety. Items are scored on a 5-point Likert Scale from 1 (not at all) to 5 (completely). The tool was filled out by the first author (KR) at the end of the observation period in August 2021.

Data analysis

The data sets of the ethnographic observations, interviews, the focus group and the quantitative assessment tool were analyzed in an iterative way. First, the ethnographic observations were analyzed by creating themes and coding (35). Insights gained there informed the analysis of the interviews and the focus group. The assessment tool was analyzed quantitatively. Iteratively, the findings from the different qualitative, as well as quantitative data sources were combined and discussed with the team. As relevant topics emerged in one data source, the other sources were searched to find insights on the same topic there. Like this, data sources informed each other, and linkages could be identified, as well as controversy (36). Each step of the data collection and analysis was noted down in a logbook, accessible for the entire team. This allowed to retrospectively follow the line of reasoning, ideas and discussion points (35).

Analysis of the qualitative data

In an iterative process, data analysis of the ethnographic field notes and interviews was performed in parallel with the data collection (32). For this, the observation notes were expanded into elaborate field notes and the interviews were transcribed verbatim by the first author. Family members and staff received a written summary of the interview for a member check (37, 38). Noting down first reflections, labels and connections in the data already collected helped the authors to focus on parts that seemed interesting and additionally, future data collection could be inspired with information from past observations and interviews (36).

After the data collection period ended, the data was formally analyzed with MaxQDA 2022. This included the observation field notes, interviews, as well as the information from the focus group. The analysis was guided by the conceptual framework developed by de Boer et al. (13). The framework describes the influence of the physical, social and organizational environment of a care organization on behavior and functioning of residents. In addition, inductive analyses were conducted, identifying any patterns or themes beyond the framework.

Data analysis followed the six-step model by Nowell et al. (35). The team members of the research team familiarized themselves with the data by repeatedly reading the different data sources. Afterwards, initial codes were generated using the observation data. Three team members (KR, BdB, SS) individually coded the same three randomly selected pages of the

observation data and discussed their ideas afterwards to reach consensus. This process was repeated a second time and results were discussed with the entire team. Afterwards, KR coded ten randomly selected pages and discussed the results with the rest of the team. After agreeing on a suitable coding strategy, KR coded the remaining observation data, as well as the data from the focus group. The broad initial codes were based on the conceptual framework, and as the data analysis proceeded, more detailed codes were developed and sorted under each concept from the framework. This step had to be done repeatedly, as new, interesting codes emerged. Additionally, KR analyzed the interview transcripts by extracting the main messages in the form of quotes. They were systematically sorted by participant group and topic in a table. By directly comparing the quotes, an overall picture on each topic and participant group could be generated.

In the next step as described by Nowell et al. (35), the data was searched for patterns, linkages, but also controversy. From this step resulted a final phase of defining and naming codes and themes. At a certain point, no new information emerged from the data. Following, the themes were tested by returning to the raw data or by comparing codes and themes between the team members. Findings were summarized, followed by a thorough discussion of the data among the entire team to determine whether the interpretation seemed complete and credible. The last step as reported by Nowell (35), producing the report, was done throughout the entire data collection and analysis period and included descriptions of the context, and the reasoning for theoretical, methodological or analytical choices.

Analysis of the quantitative data

In total, 340 points can be reached on the OAZIS-dementia tool. The 72 items are distributed over seven categories and scored on a 5-point Likert scale (34). For each category, the points reached were summed up and an average value was calculated by dividing them by the total possible amount of points. Subsequently, a final average score was calculated in the same manner (14).

Ethics and consent

All legal representatives of residents, as well as staff members received information about the study and a consent form for participation via e-mail and post. Legal representatives provided informed consent for themselves, as well as the resident. During the observations, the first author paid close attention to signs of discomfort of residents. For example, the staff member involved in the care situation asked the resident beforehand whether the first author is allowed to join. In case the resident expressed any signs of distress during the care situation, the first author withdrew her attendance. The interviews with residents were only held after getting assent from the participant (39). Beforehand, a staff member asked them whether they would like to have a conversation with the first author, who will be asking them some questions. Only when agreeing, the first author approached the resident. All data was anonymized. The GCF was asked whether its name should be publicly disclosed in this study. The study was approved by the ethical committee METC Z (No. METCZ20210097).

Results

The analyses revealed a conscious harmonization of the physical, social and organizational environment at the GCF. With 314 of 340 total points, the physical environment of the GCF scored high on the OAZIS-dementia tool. This indicates a suitable environment for people living with dementia. The observations confirmed that the architectural design of the physical environment with its indoor and outdoor spaces opened up possibilities for residents to move freely and be active. At the same time, the organizational environment was explicitly designed in a way supporting and stimulating its use with suitable organizational processes. This in turn opened up possibilities within the social environment, fostering for example social encounters. This well-balanced interrelation of the three environments seemed to benefit not only residents, but also their family members or other visitors, as well as staff members and the management.

From the analysis of the qualitative data, four themes resulted which were identified as crucial during the daily life at the GCF. These were stimulating the senses, engaging in purposeful activities, sharing responsibilities and creating a community in a new home. They serve as examples illuminating the interrelatedness of the physical, social and organizational environment.

Stimulating the senses

As part of the vision of the GCF, a strong focus was put on a stimulation of the senses and activity. Realizing this, the managers designed the physical environment in a way that activated staff and residents in a natural way. Mostly built on ground level and covered by lightly painted wood, the buildings of the GCF naturally blended into the gardens and animal meadows surrounding them. The resident rooms of each group were located apart from the common house, separated by a small garden. In the garden, a mix of trees, bushes and different colorful flowers grew, attracting butterflies and bees. This also provided residents with more advanced dementia with visual and audible stimulation, as described in the following observation note made in one of the groups:

> After the coffee, the staff member Jan picks me up from sitting at the table with the residents to quickly ask me about my first impressions. As we walk through the garden of the group, he tells me that he really likes that the residents have to walk through it to get to the common house as it gives people stimuli. He tells me about a resident who doesn't talk much, but on the way through the garden, she stops here and there and shows him a flower, or a bug, or something else catching her eye. (Fieldnote 10)

Several other architectural design choices encouraged daily activity and sensory stimulation. A daily ritual on the GCF was bringing away the garbage and the leftovers from the kitchen. Each evening after dinner, staff members collected a number of residents to participate in this household task. The containers for mixed garbage, plastic and glass were deliberately placed apart from the groups, each at a different end of the location. The leftovers from the kitchen were brought to the pigs, again located a few meters apart from the groups. The resulting evening walks not only allowed residents to contribute something useful to the community, they also resulted in daily exercise. The following observation note provides an example on how the design of the outside environment has the potential to turn a household activity into an extensive walk with a number of different experiences on the way:

> After collecting five residents, we start our walk to the pigs to bring them some leftovers from the food and the potato skins which resident Eline produced today. On our way back, we take a little extra round and turn into a path between two meadows. We come by the horses, who are standing at the fence. Resident Maria starts telling me that she also rode horses when she was younger, and we look at the small ponies eating grass. One of the large horses smells our hands curiously. We continue our walk through the two meadows until we reach the path under the trees. Here, we pass the "singing hut", a wooden hut where one can sit down and turn on some music, while enjoying the view on the horses. Maria climbs up the few steps and looks inside, then comes down on the ramp on the other side, waving at us. Next, we come by the lake where the playground for children is. We make jokes how another resident, Jacob, can jump on the trampoline if he wants, and Lydia makes music on the outdoor music instrument with her walking stick. After some minutes, we walk back through the gate towards the common house of our group. (Fieldnote 187)

This example shows how the physical environment has the potential to alter the social environment substantially, when designed consciously. In this case, the physical environment of the GCF provides the opportunity to turn a household task, like bringing away the leftovers from the kitchen, into an interesting and fun group activity, which naturally incorporates exercise. Walking to the pigs and back to their houses, residents had diverse experiences during which all senses were stimulated. Furthermore, residents were encouraged to talk about their past when seeing the horses. The following quote illustrates how placing several locations, necessary for the daily life, far apart from each other, was a conscious choice made by the managers upon building the nursing home:

> "So one of the things we also took into account in the construction here is that, well, you have to build and furnish in such a way that it is logical that you go outside. You have to go outside here whether it is storming or raining or very hot, so in that sense we strongly believe that change in the care really starts with a different way of building. And not only that you indeed have facilities and have a garden and butterflies outside, but also that you use them as an employee. And we even think that you have to further enforce that because we say bring away garbage, that's over there, they have to bring something to the animals that's over there, or they have to pick up something in the country house which forces the employees to do that too. And now it's no longer a discussion here, everybody goes outside and likes to go outside (…)" (P11, translated from Dutch)

This quote from the managers highlights the role of the physical and the organizational environment in stimulating to go outside. According to the managers, the architectural design of the outside environment can provide opportunities for activity. At the same time, it has to be designed in a way that "forces" staff to also do so.

While the design of the physical environment opened up possibilities for stimulation and activity, it also provided the opportunity to withdraw to places with less sensory stimulation. Living in a large group sometimes seemed to be challenging for some residents. The common houses were split up into a large kitchen and two living rooms. Together with the resident houses, as well as the outside environment, residents had several spaces where they could spend their time. This also provided residents the opportunity to withdraw from the group when they wished to be alone, or to be together in smaller or larger groups. During an evening observation, the first author was sitting outside on the terrace with residents and staff members. As the large group seemed to put pressure on one of the residents, a staff member took a small walk with her to a Hollywood swing a few meters apart to help her calm down:

> In the circle of residents and staff members, I sit next to Elizabeth. She seems stressed – she changes her focus very quickly, looks at different people, in between, she closes her eyes as if she wanted a break. She turns to me and says, "this is really bad". I quickly understand that she doesn't like to be with that many people. Staff member Anna, sitting in the circle with us, also notices that she is stressed and

> says: "There are too many people, right? This stresses you out" and Elizabeth nods, closing her eyes. Anna gets up and takes her arm, and together, they go for a walk. I see them sitting down on a Hollywood swing, and Anna calmly talks to Elizabeth, pointing at something she sees. After a while, they come back, and Anna accompanies Elizabeth to the inside of the common house. She seems calmer now and smiles at us when they walk past us. (Fieldnote 72)

This example not only illuminates the importance of the design of the physical environment in providing possibilities to retract. It also illustrates the critical role of staff in identifying, and resolving moments of uneasiness among residents. In this case, the staff member felt that a resident was uncomfortable, although the resident herself could not clearly state what her feelings were. Supported by the other staff members keeping an eye on the remaining group outside, she could go for a walk to calm down the resident. Being able to leave the group to help one resident relax calls for a strong feeling of collaboration among staff. At the GCF, a strong organizational culture persisted, where tasks were often shared among staff and where the well-being of residents was considered more important than potential tasks to be completed.

Concluding, the physical environment of the GCF opened up possibilities for as well sensory stimulation and activity, as the possibility to detach from too much sensory stimulation. The organizational environment played a crucial role in designing the physical environment upon building the nursing home, as well as identifying resident's needs and guiding behavior. Only in combination, the physical and the organizational environment can exercise its potential and create beneficial effects in the social environment, for residents, as well as staff members.

Engaging in purposeful activities

At the GCF were countless possibilities to engage in activities. Outside, residents could for example feed the animals or care for the garden. Inside, residents could help in the household with folding laundry, chopping vegetables for dinner or setting the tables. A common feature of these activities was that they benefitted the group or the nursing home as a whole. Other than merely taking a walk, residents could take a walk to feed the animals, which added a purpose to the activity and benefitted the community.

On the one hand, the physical environment was designed in a way that offered the possibility to engage in nature-based, or other purposeful activities, as for example household chores. Each group had for example own chickens right next to the common house who had to be fed daily. Often, this was done by residents, who were not only active physically, but also had a daily goal. It seemed as if many of them enjoyed being useful for the group, contributing something and not only receiving care, but also caring for something themselves. In addition, the common houses were designed to promote a home-like feeling and stimulate the participation in household chores. Each group had an own kitchen with a large table where staff members planned and cooked each meal themselves. This gave residents the possibility to be involved in choosing and preparing the food. At the same time, the smell of freshly cooked meals activates the senses and makes a place feel like home, as one family member noted:

> "I think they first have to build the nursing homes differently, (…) often the kitchen is central and the food is brought there. Here they cook themselves so then you have that home-like feeling again. When you come in here you immediately smell the food, so yes that is just the hominess" (F5, translated from Dutch)

This quote by a family member highlights the positive effects of cooking within the resident groups, as the smell of a freshly cooked meal contributes to a home-like feeling. At the same time, cooking within the group offers residents the possibility to participate in the activities in the kitchen and hence to be active and contribute something to the community.

The observations highlighted the important role of staff when involving residents in activities around the household. At the GCF, a strong feeling of living here together and sharing a household persisted among staff and residents. By regularly spending time within the groups, the managers explicitly encouraged staff members to think of every task to be completed as an activity for residents. Staff members seemed to have internalized this vision, exemplified in the following observation:

> After I finish my coffee, I walk inside to the kitchen to put my cup in the dishwasher. Staff member Hanna sees me and tells me that I can just leave the cup on top of the counter, because residents often help cleaning the kitchen and they will later put the cup in the dishwasher. (Fieldnote 24)

In this example, the staff member purposefully reserved work for residents by hindering the first author to put her own cup in the dishwasher. During the observations, the first author also often noticed how staff members had a special way of motivating residents. For example, instead of asking residents whether they could fold the laundry, they asked whether they would be so kind to help them with folding the laundry. It seemed like residents were usually keen and happy to help the one asking and immediately joined the task. Moreover, staff members often created a fun and inviting atmosphere during these activities, illustrated by the following observation note:

> After cleaning the dishes, the hostess asks three residents sitting at the kitchen table to help her dry. She hands Anna, Eline and Gerda a towel and they start drying the cups. Eline seems to like helping with household tasks; I saw her peeling potatoes a lot, drying dishes or folding clean cloths and towels. Another resident, Jacob, comes to the table and the hostess asks him whether he would like to help, too. He agrees and also receives a towel and joins the ladies. I sit on the terrace with some other residents and hear the people in the kitchen sing some old songs together. Jacobs loud, deep voice and the hostesses higher voice reach us at the terrace. (Fieldnote 236)

The participation of residents in a common household task has the potential to become a social activity where everyone involved benefits. Not only the residents, who contribute something and are active cognitively and physically, while enjoying to sing, also the staff member who can share the task benefits.

In conclusion, the GCF with its indoor and outdoor environment provided the residents with a variety of possibilities to be active in a purposeful way. At the same time, staff members played a crucial role in motivating residents in the right way, addressing their wish to help. Involving residents in activities evolving around the household, the animals or the gardens created a community feeling, as residents contributed something to their group or the nursing home as a whole. Often, these activities became a social event, with staff and residents benefitting similarly.

Sharing responsibilities

According to the managers, life at the GCF should be as normal as possible for residents. They were encouraged to take own decisions, do what they liked and move freely on the location. One important element for realizing this were open doors. Residents could move independently between the common house and their rooms, located in small houses separated from the common house by a garden. Being outside every day, residents experienced the seasons, different weather, and had a feeling of "going somewhere" and "coming back home". Animal meadows surrounded the houses of each group and served as a natural barrier to the rest of the location and the village. However, the gates to the location were always open, allowing residents to not only take a walk in the garden of their group, but also freely access the three-acre location with its animals and gardens. Valuing the dignity and independence of residents, there was no explicit emphasis on constantly keeping an eye on them. Still, several elements within the physical and the organizational environment supported residents' freedom, and, at the same time, residents' security. Within the physical environment, this were architectural and technological measures, within the organizational and social environment, sharing responsibilities played a key role.

An architectural measure was the built-design of the common houses, with their bottom deep windows, which could be opened as doors. Being built on the ground floor and having glass doors on all sides of the house had several advantages. First, the windows provided natural light for the indoor environment. Second, residents spending time in the kitchen or living rooms could watch the outdoors with its nature, animals or people coming by. Third, residents could easily access the outdoor environment from several sides of the house. Lastly, staff members could easily oversee events taking place both inside and outside.

Furthermore, several technological measures, such as sensors, supported the security of residents. Specifically relevant during the day were the sensors applied to the gate, separating a group from the rest of the location. According to the managers, one to two residents per group had a sensor applied to their clothes. Whenever a resident with such a sensor walked through the gate, the telephones of the staff members rang. This allowed them to follow their tasks without having to constantly watch the gates. As the telephone rang, they quickly checked who walked in- or outside and could decide whether this person needed assistance.

Despite these architectural and technological measures enabling residents to freely move on the location, the sharing of responsibilities between the management, staff members and the family of each resident was a crucial factor enabling residents' freedom. Before moving into the GCF, the managers informed the family members of a potential new resident about the open door policy. Consequently, only residents moved into the facility, whose family took the informed decision in favor of open doors. According to the managers, the families valued the positive effects resulting from the freedom higher than the potential risks. Knowing that families were in favor of open doors and aware of the risks coming with it, staff felt more secure to allow residents to take a walk and be active on their own. This substantially increased the time residents spent outside. Nevertheless, the risk of residents getting lost is an undeniable factor in nursing homes for people with dementia. The management of the FCG indicated that residents walking beyond the perimeter of the locations only occurred a few times in the last years. In line with the wishes of staff and families, the managers strongly contradicted closing the doors of the GCF because of single cases, which would result in negative consequences for all residents. Instead, in the few cases where residents tended to walk beyond the perimeters of the location, they brought together the family and staff members to jointly decide how to prevent such incidents in the future. The following quote from the managers shows how a family assessed the situation in a case where a resident liked to take walks outside the location and might get lost:

> "Well, that is quite exciting, also for us - we have very well discussed with the family, how do we deal with it? And the family is really agreeing. The family also wants someone to have the freedom to walk, and takes the risk; well that could also go wrong in a very bad case, right? (…) That requires talking to family and also in the team: how do you deal with that? Because it is a kind of balancing act, isn't it? Because it is not like let them go and you do not have to watch them, you have to watch them!" (P11, translated from Dutch)

This quote exemplifies the close collaboration between the management and the families. The fact that family members were aware of the risks and could bring in their own wishes concerning the measures taken relieved staff of responsibility. During the observations, also staff widely seemed to value the freedom, which residents had, and accepted the risks coming with an open-door policy. The following quote from a staff member represents the common belief on the GCF that the freedom outbalances the risks of getting lost:

> "Well, whether you work in a nursing home or on the care farm, risks are everywhere. And the risk of someone leaving [the location] is there! And it's fine that it's there! Because in order to make this possible, you have to have some kind of acceptance that it can happen, and I wouldn't want to change that. I would find it terrible if the doors would close (…) because I think there are bigger risks than when they are open. The moment someone can no longer get out, someone will think of how he or she can get out. And then they go under or climb over the fence and that brings more risks with it, than that someone can walk out of the fence and I get a ring and see hey, someone walks out of the gate." (P9, translated from Dutch)

The interviewed staff member seems highly positive about the open door policy and even considers the risks of closed doors as more severe than the risk of open doors. The fact that the staff member does not share concerns regarding the responsibility of a lost resident indicates a strong organizational support and cohesion of involved parties.

In conclusion, the example of open doors illustrates how a close collaboration between the social environment, i.e. the families, and the organizational environment, i.e. staff and management, can have positive effects for residents. Together with architectural and technological measures taken to increase oversight of the location, the freedom of residents can be fostered, who might otherwise be restricted due to security reasons. This interrelatedness of the three environments opened up possibilities for residents to engage in activities within their group, or even on the entire location.

Creating a community in a new home

The observations revealed a home-like atmosphere at the GCF. Creating a sense of home and having as much of a normal life as possible was one of the most important goals of the managers. They lived next door and were often present on the premises. In the first years after opening the location, both worked in the groups themselves, which facilitated the transportation of their vision by being a role model. Until today, they regularly spent time in each group to collaboratively create a community, support the staff members in their daily work, and to be able to correct habits not in line with their vision. The following situation illustrates how the managers actively corrected habits in order to create a more home-like atmosphere: One day, after starting the observation period in a new group, the first author realized that this group used plastic cups during lunch, instead of glasses like the group before. A few weeks later, during the interview with the managers, they stated the following:

> P11: "Then I see for example at a group suddenly that they drink with colored cups, like plastic colored cups. We don't do that at home either, we don't drink from a plastic cup! (…) that is an example of how it is probably more practical or handy and you can stack it (…)." (P11, translated from Dutch)

> P12: "This is often the case in health care; we don't want the convenience of the organization to be the guiding principle, the guiding principle is that you just live your life the way you do. And if you drink out of a glass, you drink out of a glass, that's what you did at home, then here too. (…) And the care sector is very often used to working very much from an organizational perspective or from an efficiency perspective and that is not the same as creating the best atmosphere." (P12, translated from Dutch)

This quote illustrates how both managers preferred atmosphere to efficiency. This included details like the use of glasses instead of plastic cups, but also that residents used the same dishes as staff members. This, according to them, supported a home-like, community feeling and showed respect for the residents and their way of living.

At the same time, a cozy atmosphere was also created by the design of private and communal areas. Aimed at seeming more like a vacation park than a nursing home, the buildings of the GCF were mostly built on ground level and covered by wood. The furnishing of the indoor environment further supported a home-like atmosphere. Residents were not only invited to furnish their own room individually, they could also bring for example art and furniture for the common areas. Possibly attributed to the fact that residents contributed to the decoration

of the common house and helped with the household, a strong sense of being part of the community became apparent. Often, residents intrinsically picked up a pillow lying on the floor, swept the terrace, cleaned up leaves from flowers, or had a precise idea of how the lace should be folded. This is illustrated by the following observation made after lunch:

> After we cleaned up the table – again, all residents helped – we put the flowers back on the table. Some old leaves fall down on the floor and resident Margot directly reaches down to pick them up. She sees some more of another bouquet and walks over to also pick those up. "Very nice, thank you" I say and she looks at me, smiling and saying that she likes it clean. Resident Willeke joins our conversation and says that she also hates it when the white lace is thrown in some corner while the table cloth is on the table during eating times. "Yes, Willeke really doesn't like that!" Margot laughs. "We always fold it nicely and put it over the sofa." (Fieldnote 272)

Additionally, a friendly and inviting culture persisted at the farm, described by both family members and staff during the interviews. A family member for example stated the following after being asked how the relation with the staff is:

> "Yes also like that, just loving, warm, yes, understanding. Also know who you are. Know that you have been on vacation when you come back. You actually- when I come here it is like coming home again. Really coming home. It is a kind of second home." (F2, translated from Dutch)

The observations showed that, indeed, many family members came to visit. Staff members always made sure that they felt welcomed and comfortable by offering them a coffee and a seat, and asking how they are. Family members visiting during mealtimes were invited to join the meal along with residents and staff members. Enjoying the welcoming atmosphere, many family members spent the time with their loved one not in the private room but within the group, having conversations with the other residents as well. Indirectly, this relieved staff members from a part of their supervising tasks and added to the social interactions of residents. Knowing that a family member was keeping an eye on the group sitting on the terrace or in the living room, staff members could focus on residents in other rooms or spend more time with those needing individual attention.

In conclusion, the physical environment, as well as an organizational vision exercised by management and staff created a home-like atmosphere at the GCF. This resulted in residents feeling a sense of ownership, intrinsically keeping their common house clean. Furthermore, family members felt welcomed and by staying within the group, indirectly relived staff members by watching out for residents.

Discussion

This study explored the care environment of GCFs for people with dementia. Four central themes could be identified: stimulating the senses, engaging in purposeful activities, sharing responsibilities and creating a community in a new home. In comparison with traditional care, GCFs are radically different in the physical, social and organizational environment. The findings accentuated the necessary high degree of interrelatedness of the three environments, each one supporting the others. Designed in line with the organizational vision, the physical environment provided opportunities to stimulate the senses, activity and social encounters. The organizational environment played a key role in activating residents and hence optimally using the physical environment. By sharing the responsibilities and creating an inviting atmosphere, the social network of residents was included into decisions and in the daily life on the GCF. Consequently, residents, their families, staff members and the management benefitted from social interaction, activity and collaboration.

The crucial role of the management

The findings of this study highlight the crucial role of the managers of the GCF in paving the way in the physical, social and organizational environment. Based on their vision, they designed the three environments in a way that each one increased possibilities within the others. As the GCF was newly built, the physical environment was planned by the managers of the GCF. Hence, its design, including the buildings, indoor decorations and outdoor facilities was a conscious organizational choice, intended at creating possibilities for stimulation, activity, social interaction and a home-like atmosphere. Consequently, the physical environment is, to a certain degree, dependent on organizational choices.

As this study showed, the design of the physical environment substantially shapes the realization of organizational goals and visions. This is in line with previous research, indicating that the design of buildings is correlated with a higher quality of life of residents (18). Furthermore, research has shown that residents' social life and engagement in activities depend on a dementia-sensitive environment (40, 41), and that the physical environment forms the basis for what residents perceive as home-like (42). Additionally, GCFs actively use nature to provide naturally-emerging, purposeful activities. Gardens are suggested to reduce agitation in people with dementia (43) and may have positive effects on psychological well-being and loneliness (44, 45). Furthermore, evidence is accumulating that residents' interaction with animals, e.g., animal-assisted activities or animal-assisted interventions, could have positive effects. For example, positive emotions and social interactions were registered more frequently and longer (46). Additionally, a

systematic review showed that social functioning was improved across all severity levels of dementia (47) and other findings suggest that the progression of agitation or depression could be slowed down (48).

At the same time, this study shows that the day-to-day organizational processes the social context are equally important as a suitable physical environment. Staff members using the physical environment in the right way and including residents and family into day-to-day activities, are essential (43, 49). This indicates a need of nursing staff to adapt their way of working to encourage residents to participate in daily activities (50). Here, too, the management of an organization plays a crucial role as they can actively support staff members in executing the vision by creating a suitable organizational environment. Previous studies have found for example that shared values and supportive leadership for staff help in setting priorities and improve the delivery of person-centered care (25, 51, 52). This study builds on these results and shows that the underlying organizational processes, including for example the leadership style, rules and routines within an organization substantially shape the way, in which daily life is organized and ultimately how care is delivered. An example is to leave staff members flexibility in deciding the daily time schedules. Sometimes, it takes longer to include residents into tasks and a culture following strict routines might hinder the daily engagement of residents. Furthermore, the management can pave the way in the social environment by creating a positive atmosphere. Establishing a social environment that also builds and fosters activity, collaboration and a positive atmosphere ultimately benefits all groups involved (53, 54). This study showed how this could also feed back into the organizational environment by relieving staff members of supervisory tasks. Rethinking dementia care by radically altering the physical, social and organizational environment to better meet the needs of residents indicates a rebellion-like mindset of the founders (27, 55). This includes creating an environment, which is focused on seeing the person beyond the disability, instead of the convenience of the organization.

Collaboration between management, staff, residents and families

Building on the described preconditions in the physical, social and organizational environment, the atmosphere on the GCF was characterized by a sense of "doing everything together". On the one hand, this was attributed to the active collaboration among staff, management and families in decisions concerning residents. Because families were aware of potential risks and took the informed decision of accepting these, staff felt more secure to allow residents to use the outside environment on their own. Furthermore, the open and inviting atmosphere at the GCF encouraged family members to spend time within the group. Research has shown the importance for residents to preserve their former social network and that their family or friends feel welcome in the nursing home, for example through nurses greeting them and offering them a seat and a coffee (56). Forming a community of residents, staff, families and the management builds on the principle of relationship-centered care (57, 58). Relationship centered care stems from a more inclusive approach to dementia care, recognizing also on the social network of the person with dementia. The initial focus on couples has gradually expanded to the wider family and beyond; consequently, the focus of care provision is not only on the person with dementia. Instead, it includes the well-being of family and the reciprocal ways in which people with dementia also can give back (59).

Valuing the ways in which residents can also give back indicates the second reason for a feeling of "doing everything together", which is the active encouragement of residents to contribute to the community with their individual skills. One of the key goals of the GCF was the inclusion of residents into purposeful activities, such as household chores. Residents were consulted for the selection of meals and the preparation of such, as well as involved in bringing away the trash at the end of the day or feeding the animals. This contradicts a more traditional view where the staff member takes over as many tasks as possible for the resident (60). Previous research has found that a key determinant of the quality of life of people with moderate to advanced dementia was contributing to the household (61) and generally giving a meaning to life (62). Explicitly taking a resident perspective and designing a nursing home supporting their needs and wishes indicates a culture change within nursing home care (63, 64). This includes the creation of environments that "allow the person with dementia to be an active participant in everyday life rather than a passive recipient of care" [(64) p. 186–7] and is in line with Kitwoods theory of person-centered care (65). The basis is a positive attitude toward the person with dementia, his or her unique personality and maintaining and strengthening of the personhood. Kitwood (66) emphasizes the necessity to satisfy the psychological needs of people with dementia, as this is the prerequisite to function as a person. This can be translated into practice by not looking at what people with dementia cannot do anymore, but instead embracing their interests, their pleasures and the use of remaining capacities (67). On the GCF, staff actively used and fostered the abilities that residents still had and often motivated residents to use their skills to contribute to the community in a meaningful way. Interestingly, this seemed to result in a feeling of a shared household, as there were also moments where residents intrinsically for instance arranged the flowers or put the tablecloth on the table. Taking own initiative and contributing to the household indicates that residents, too, felt that they were "doing everything together" and potentially contributed to their sense of being at home in the nursing home.

The fact that residents, their families and staff members equally seemed to benefit from collaboratively doing life, seemed to preserve the initial vision the managers implemented. In the seven years since the foundation of the GCF, the vision seemed to be transported between generations of residents, families and staff members. Only with minor corrections, the managers succeeded to continue delivering the care they defined upon founding the nursing home. This shows how radically rethinking dementia care requires passionate leaders, transporting their vision and paving the way in the physical, social and organizational environment to initiate change. When implementing new ways of working, they ultimately might prove to benefit all stakeholders involved. This can create a valuable partnership, where staff members enjoy their work, families feel appreciated and residents with dementia can be valuable contributors to the community.

Methodological discussion

The present study provides an in-depth exploration of the care environment of an innovative care concept. A care organization consists of infinite preconditions, processes and uncertainties, which makes a complete assessment impossible. In this context, the combination of diverse methods can be considered as a strength, because it enabled a detailed exploration of the complex environment, including the perspectives of involved stakeholders. Corresponding to a constructivist approach to data collection and analysis, the researchers inherently are subjective (68) and previous experiences might influence data collection and analysis. This requires reflexivity from the researchers. Within the research team, the experiences made, the data collected and the analyses were regularly discussed to include other perspectives. Furthermore, involving another team member into data collection validated insights. A common problem within qualitative research is the Hawthorne effect, which describes the phenomenon of participants behaving differently because they are studied (69). The long time frame of several months was chosen to mitigate this effect, as staff, residents and families became used to the presence of the researcher.

Conclusion

In conclusion, the way in which a care organization is designed significantly impacts residents' daily life and their mental, physical and social functioning. To better meet their individual needs, GCFs have radically altered the physical, social and organizational environment. By aligning the three environments, and using each one to support the others, the GCF created four powerful topics, defining daily life. These were stimulating the senses, engaging in purposeful activities, sharing responsibilities and creating a community in a new home. This study showed that in order to successfully innovate long-term care, leaders are needed who rethink existing ways of care delivery. This begins with sensing opportunities and transforming the physical, social and organizational environment to support their staff seizing these opportunities. The physical environment needs to be designed in an encouraging way, stimulating activities. A social sphere has to be created where everyone is welcomed openly and where the entire network of the organization thrives through collaboration. Finally, to successfully lead change, organizational processes have to fit the vision, and support residents, staff, families and management equally in executing the vision. Creating an environment where all stakeholders of a care organization benefit leads to a collaborative, productive way of delivering care to those in need.

This study contributes to the research field by providing an example on how joint alterations in the physical, social and organizational environment of a care organization can lead to sustainable changes, benefitting all stakeholders. Learnings from GCFs are possibly transferable to other care settings, facing difficulties in bringing about change. With further research, the role of the organizational environment could be explored in more detail, identifying strategies actively supporting a culture change within long-term care organizations. Furthermore, insights into barriers and facilitators in doing so might help nursing homes to adapt to new ways of delivering long-term care.

Data availability statement

The original contributions presented in the study are included in the article/supplementary materials, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by Medisch Ethische Toetsingscommissie Zuyderland en Zuyd Hogeschool (METCZ20210097). The patients/participants provided their written informed consent to participate in this study.

Author contributions

This project was designed by KR, BB, and HV. KR collected the data with help of SS. KR conducted the main analyses and wrote the manuscript, both with assistance of BB, HV, SS, and JS, who provided feedback and guidance. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Personal assistants in England and the factors associated with absenteeism

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Personal assistants (PAs) have become an increasingly important element of long-term care (LTC) in England since the introduction of Direct Payments in 1996 and the Care Act 2014 legislation. The PAs, who are directly employed by social care users, can perform a number of support tasks including vital assistance in activities of daily living (ADL). Internationally these roles would be classed as domestic care work, including the employment of migrant care workers, e.g. in Germany and Austria. High turnover rates and work absenteeism in this market can cause disruption of these important daily activities, causing LTC users to potentially suffer neglect and poorer quality of life. Although there is research on turnover and absenteeism in nursing workforce in hospitals and LTC workers in nursing homes, little attention has been given to reasons for turnover of PAs and even less for absenteeism, which often precedes turnover, in a workforce of over 100,000 people in England. This research aims to fill this gap in knowledge by analyzing the reasons behind the absenteeism of PAs using quantitative methods. We used survey data of PAs in England, exploring the factors associated to one form of absenteeism—sick leave from work. After controlling for a number of factors ranging from job characteristics such as number of hours worked and type of contract, socio-economic characteristics from the PA and their employer, and supply and demand factors at local government region, the findings suggest a number of factors that significantly influenced sick leave, including distances traveled to work and number of PAs employed. Following the analysis, two people with life experience of LTC discuss the findings of the study and how they compare to their experiences of the market for PAs, providing a unique perspective from the people who could benefit the most from improving PA retention and reducing absenteeism.

KEYWORDS

long-term care, personal assistants, domestic care workers, absenteeism, older people, home care, sick leave

Introduction

Increasingly many countries deliver long-term care (LTC) at home. This choice, as opposed to the more costly institutionalized care, aims to meet the needs of the aging population of countries (1) while guaranteeing quality of life in accordance with principles outlined by the United Nations (2). Moreover, this choice respects the preferences of those requiring LTC support as they find it more comfortable staying in familiar surroundings (3, 4). Limiting public social care expenditure has been pursued by many countries and the motto "aging in place" at home fits well with this goal (5).

Countries such as UK, Austria, France, Finland, Germany and USA, among others, provide benefits in cash to help older people pay for home care services (6–8). Even China, a country that until recently enjoyed a relatively young demographic structure and culturally expects family to care for their elders, has implemented pilot programs for long-term care insurance (LTCI) that include cash benefits in some cities as a potential policy instrument to deal with the demographic change that will see the proportion of people over 65 years old increase from 13% in 2020 to 27.9% by 2050 (9, 10). In the UK, current legislation has enabled LTC users to directly employ Personal Assistants (PAs) by using direct payments to best support their LTC needs. Initially set in the 'Direct Payments Act 1996', the take-up of direct payments started slowly but increased over the years going from 65,000 in 2008 to 230,000 people receiving the benefit in 2020 (11–13). Further, the 'Care Act 2014' implemented the 'personal health budget' (PHB), organized by the UK's national health system (NHS), as an additional mean through which people with ongoing health issues can hire staff to meet their health needs. However, there are limitations to what type of work can be done by the PA according to the source of funding, e.g. PHB funds are for health related services only and not social care. The common overlap between health care and social care aspects in LTC means it is sometimes difficult to disentangle the two and many PAs are willing to provide health related care, subject to proper training (14). The focus of this study is in the social care element of LTC, specifically of PAs providing home care, but without ignoring the relevance and importance of health care and the existing body of evidence from care homes and nursing homes.

To be defined as a PA in England, one has to be employed directly by a person who needs support or by a family member or representative of a person who needs support, working directly in a person-centered way to enable them to live their life according to their wishes and interests (13). In other countries, PAs are called personal care workers, caregivers or domestic care workers and other similar names. The definition of their roles also differs from country to country. Our interest is in the domestic care workers as defined in England, where their work can involve supporting care users to perform standard activities of daily living (ADL), such as showering and dressing, but can also include organizing and supporting individuals with their social and physical activities or supporting with tasks around the house such as shopping, cleaning and cooking (15). There are estimates of about 100,000 people employed in 135,000 jobs as PAs providing care to those who receive direct payments (13). It is unknown as to how many people self-fund employment of PAs and how many people receiving PHBs may also employ PAs. Nonetheless, the lower-bound estimate of 100,000 PAs in England represents around 6.5% of the adult social care workforce of 1.54 million (16).

Those directly employing PAs deal with the recruitment and retention of staff. Added to this, any turnover and vacancies for PA staff will necessarily affect the wellbeing of those with LTC needs. In England, turnover of PAs is usually lower than for the care workforce in general. For 2022, PA turnover was estimated to be 18.3%, lower than for care workers in the independent sector which stood at 35.3% (13). This might be explained by the fact that being directly employed by the service users allowed for closer relationships to be formed, thus reducing turnover and absenteeism (17, 18). It might also be due to differences in the work carried out by workers and better terms and work conditions for PAs (13). Even so, the turnover rate for PAs in the UK is higher than for nurses (19).

Although substantial qualitative work has been done exploring the dynamics of PAs and their work and relationships with IEs (20–24), there is currently little quantitative evidence about the factors that affect the recruitment and retention of PAs. Gousia and Allan (25) found that economic factors, including local unemployment rates and alternative social care employment, influenced the PA staff turnover and vacancies faced by service users. This supported previous qualitative evidence for PAs for England (24, 26, 27). There is also limited international research on the economic factors affecting the satisfaction and commitment of domestic care workers. Evidence on Israeli migrant live-in care workers found that the level of needs of the caree, e.g. living with dementia, the level of job control and the relationship between carer and caree affected job satisfaction, burden and intention to leave (28–30). More widely, evidence from the US has found that home care workers' pay and conditions significantly influenced their turnover and intention to leave (31, 32).

In this study, we assessed the economic factors driving absenteeism of PAs. In the economic literature, there is a strong link between absenteeism and other decisions regarding employment, including (voluntary) staff turnover. We describe this link more fully for LTC in the next section, before we present the data, methods and findings of the study. Two people with experience of direct payments then discuss how these findings fit with their view of the PA market and what the findings mean for policy and practice.

Background

It has long been understood, in all industries, that overall job satisfaction is consistently and inversely associated with job turnover (33, 34) and attempts to understand the causes of both turnover and absenteeism have been widely discussed and theorized since then (35). Similar to other industries, LTC staff, despite altruistic motivations and a vocational view of their jobs (36, 37), are significantly negatively affected in their job satisfaction, likelihood of quitting and wellbeing by low pay (usually at minimum wage), lack of career progression and challenging work conditions. This has direct implications on retention, productivity, work ethics as well as care outcomes and service users' quality of life (38, 39). Adequate pay is seen as an important means for retention of LTC workers (40). As such, there are efforts to establish pay scales in accordance with the level of work required from PAs, their roles and responsibilities, so that they are competitive in comparison with other industries with similar levels of experience and qualifications (41), but this would have to take into account local government LTC budgets. For those that employ PAs to support their health and LTC needs, the direct employment relationship and the pressure that can come with organizing this can add further stresses to the employer/employee roles (12). In some countries, the use of migrant workers presented itself as a solution to shortages in the accessibility and availability of formal care service provision, but this came with other issues such as a hierarchical relationship between care worker and employer, lack of proper training and insecurity about working conditions and legal status (42).

Any form of absence from work that is not planned in advance, including sick leave, is considered absenteeism. The cost of absenteeism for employers in general can be high, and for IEs in particular the loss of a member of staff could have negative implications for their wellbeing and health. In addition, work behaviors, including absenteeism, are likely to be linked to the same precursors that drive employee turnover, such as low commitment and job satisfaction (43). Qualitative research in France in nursing homes indicates that not only did absenteeism lead to a harmful impact on the quality of care received by patients, it was also intertwined with work overload and stress, a deterioration in nurses' attitudes and behaviors, which turned into a harmful spiral (44). Evidence from the Netherlands suggest that absenteeism of nurses in care homes were directly associated with staff health issues only, but signaled that poor or decreasing organizational commitment could lead to reduction in wellbeing and an increase in health complaints, and therefore higher absenteeism (45). In the LTC market in England there is evidence of higher turnover for those employers with higher absence rates, measured by sick days (46). In 2021, on average, PAs in England took 2.2 days of sick leave in the past 12 months, which was almost four times lower than the average number for care workers employed by for-profit and not-for-profit LTC providers (13).

TABLE 1 Domestic care workers market size.

Country	Number of PAs	Year	Comment
Austria[a]	12,806	2020	Considering full-time mobile workers only, the actual number of workers is higher.
England[b]	100 thousand	2022	Low estimate considering only carers paid with Direct Payment
Germany[c]	317 thousand	2017	Outpatient nursing carers involved in body care and housekeeping
Netherlands[d]	100 thousand	2019	LTC workers at home, including nurses and personal carers
South Korea[d]	248,269	2019	LTC workers at home, including nurses and personal carers
Switzerland[d]	48,220	2019	LTC workers at home, including nurses and personal carers
USA[d]	1.3 million	2019	LTC workers at home, including nurses and personal carers

Source: [a](43); [b](13); [c](44); [d](45).

The relevance of understanding turnover and absenteeism in this industry is linked to the size of the markets for PAs internationally, which are large and likely to grow in the future given aging populations. Measuring the exact size of these markets is difficult as many countries do not conduct systematic surveys, with many estimating the overall number of domestic care workers, providing an approximation at best. The definition of PAs and nurses varies across countries, which also contributes to the difficulty in obtaining precise estimates that are comparable across countries. However, it is safe to say that the size of the PA market is considerable in some developed countries as shown in Table 1.

Data

The data for this study came from the Skills for Care survey of Individual Employers (IEs) and PAs collected in 2019. The Skills for Care (SfC) is the strategic workforce development and planning body for adult social care in England and works with employers, PAs, government and partners to produce reports on the status of the social care workforce and other relevant information essential to understand the key drivers of workforce change through the use of insight, data and evidence (47).

The SfC survey of IEs and PAs was conducted anonymously across England and started in January 2019. Through the use of two national support organizations and an online survey, SfC surveyed nearly 18,500 IEs and their PAs (48). All IEs and their PAs who were in contact with the national support organizations were encouraged to participate. A little over 10% of the surveyed

IEs returned a response along with 2,428 PAs, corresponding to roughly 2.4% of the total number of PAs in England. The respondents represented all regions of England and nearly all the local government areas (Local Authorities, 136 out of 152).[1] The survey focused on IEs in receipt of direct payments but also included IEs funding the payment of their support staff through private self-funding or PHBs provided by the NHS. For the purpose of the survey, PAs were considered to be any social care support worker hired directly by the IE or by their relatives or legal representatives. The data controllers of the secondary data used in this research, Skills for Care, anonymised the data before it was handled by the researchers and the study was part of a wider project which received ethical approval from the University of Kent SRC Ethics Panel (ref SRCEA 240).

There are few published studies with a large number of PAs being surveyed, making comparisons between samples difficult. Nonetheless, other studies with smaller sample sizes such as Woolham et al. (23) and Shakespeare et al. (22) show that the typical PA in England is a white British woman around age 45, very similar to what is shown in the following section. Although the survey may not be representative of domestic care workers in England, the survey data was used as the basis for national estimates of the size of the PA workforce and their pay and hours of work and so can be seen as the most comprehensive data currently available (48). As such, it contained relevant information essential to this study. In the PA survey, personal information was collected such as gender, age, disability, ethnicity, nationality, social care qualifications alongside work information such as basic pay, the number of jobs the PA has, how many years of experience in the role or elsewhere in the social care market, the type of work contract, number of hours worked and the distance necessary to travel to work. The survey also asked PAs for the number of days of sick leave that they had over the last 12 months. The IE survey also collected useful information for this study, specifically their age, the number and types of support needed, the way through which they funded payments for the support staff and the total number of PAs employed. We also linked Local Authority area data with the location information provided in the IE survey, using Job Seeker's Allowance rate, an unemployment benefit, as a proxy for available workforce in the area. As a proxy for the demand for LTC workers in each area, the availability of supply of social care was measured through the number of registered care homes and home care providers according to the registry kept by the Care Quality Commission (CQC).

1 Sample percentage of Local Authorities present in each region of England: East Midlands (89%), East of England (100%), London (91%), North East (83%), North West (91%), South East (74%), South West (93%), West Midlands (100%) and Yorkshire & Humber (93%).

Sample and descriptive statistics

Table 2 contains summary statistics of the initial sample of PAs after matching with their respective IEs, a total of 2,304 observations. The majority of PAs are female (83.4%). The average age is 45 years old, most of them are white as only 14.4% declared themselves to be not white. Less than 5% of PAs reported being disabled and slightly less than a fifth of them (18.8%) had more than one job. The average distance that they had to travel to work was 5.88 miles. Most of the care workers had a permanent contract (84.7%) and they had on average a little <4 years experience in the role (3 years and 9 months), earning on average £9.29 per hour (∼EUR 11) working 17.42 hours per week. Most PAs did not take sick leave, as 28.0% reported taking sick leave in the last 12 months taking on average 6.1 days of sick leave for this subsample and an overall average of 1.7 days for the whole sample. About a quarter of IEs had more than one type of support need (26.5%), about three in 10 had a learning disability (29.5%) and a quarter were over 65 years old (24.6%). Most of the IEs were funding the payment of PAs with Direct Payment benefit, with a minority funding it with PHBs or private funds (10.3 and 10.5% respectively). The average IE also employed more than two PAs (2.37) to work for them.

The sample had 2,052 matched observations, between PAs and IEs, where PAs answered whether they had taken time off work due to sickness. We excluded from this sample observations with no data on variables of interest including distance to work, pay, number of jobs, tenure and hours of work (leaving $n = 1{,}055$). We then further restricted the sample to account for outliers for sick leave (more than 25 days), basic pay rates (> £15 per hour), distance to work (> 50 miles), age (only including PAs aged 16–90) and hours of work (< 40 hours a week), providing a final sample of 1,016 observations in our regressions.

Methods

We estimated the following model of sick leave:

$$Sick\ leave = f(\alpha, \gamma, \delta, \theta, \upsilon) \quad (1)$$

where taking sick leave, measured as either a binary yes/no measure of having at least one spell of sick leave in the last 12 months or as the total number of days of sick leave, is a function of the PAs' characteristics (γ), such as their personal or job characteristics; the IEs' characteristics (δ), for example, the number of PAs that they hire or the type of support they need; the Local Authority characteristics (θ), which includes the Job Seeker's Allowance rate and the supply of social care; a constant (α) and a residual error term (υ). We also included regional dummies, accounting for unobserved systematic differences between regions and clustered standard errors at LA-level to

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TABLE 2 Summary statistics.

Variable	Mean	Standard deviation	Observations
Personal assistant			
Sick leave (yes, %)	27.97	44.90	2,052
Days of sick leave	1.70	7.27	2,052
Basic pay rate (British pounds)	9.29	1.70	2,060
Distance from work (miles)	5.88	12.12	1,915
Permanent contract (yes, %)	84.70	36.00	1,915
More than one job (yes, %)	18.80	39.08	2,229
Years in the role	3.81	5.28	2,001
Fixed hours (yes, %)	79.10	40.67	2,124
Hours worked (week)	17.42	17.49	2,076
Female (yes, %)	83.41	37.21	2,212
PA disability (yes, %)	4.23	20.14	2,150
Non-white (yes, %)	14.46	35.18	2,220
Age	45.39	14.27	2,175
Individual employer			
More than one type of support need (IE)	26.50	44.15	2,294
IE learning disability (yes, %)	29.56	45.64	2,304
Direct Payment* (yes, %)	81.17	38.69	2,304
Personal Health Budget* (yes, %)	10.33	30.44	2,304
Self-funded* (yes, %)	10.55	30.72	2,304
Total number of PAs employed	2.37	2.22	2,274
IE is 65 years or older (yes, %)	24.58	43.07	2,266
Local authority			
JSA allowance (rate of uptake)	0.67	0.45	2,262
Total number of home care providers	86.14	60.93	2,270
Total number of Care Homes	170.34	129.40	2,270

Source: Skills for Care survey of Individual Employers 2019. *Individual Employers had more than one option to fund their home care.

account for any similarities encountered by PAs located in the same LA (e.g. local job market conditions, transport).

We estimated this model using two specifications to account for the nature of the measure of sick leave. First, we estimated a probit regression of sick leave. The probit model calculates the probability of an event given a set of characteristics. Therefore the model is appropriate in this scenario, where the dependent variable is binary and assumes the value of 0 if no sick days have been taken and 1 if one or more days of sick leave were taken in the last 12 months. Calculating the marginal effects after the probit model yields the coefficients of each independent variable, showing the magnitude of the relationship between each one of them with the likelihood of taking sick leave.

The second specification used was tobit regression. This model used the number of days of sick leave as the dependent variable with the same set of characteristics as regressors. The tobit specification allows for the dependent variable to be limited in either its lower (left) or upper (right) values. In our case, the number of days of sick leave taken is skewed to the left and censored at zero, therefore making the use of the tobit model appropriate.

The above models were estimated with standard errors clustered at LA-level, which assumed that the amount of sick leave taken for each PA may be linked in an unidentified way within the same LA. To explore this further, we also specifically allowed for the nesting of PAs within LAs by using multi-level specifications. This assumed that the sample of PAs was drawn from a sample of LAs and to account for this a random intercept was included to allow for variation in sick leave by LA. We ran both multi-level specifications for probability of sick leave (probit) and sick days (tobit).

Results

Table 3 presents the estimation results from the alternative specifications of the sick leave model. The first set of results, originating from the probabilistic model, is presented in the second column left to right, followed by the results of the tobit model, also known as censored regression model, in the third column. The probit results express the change in probability of having a sick day while the tobit model show a change in the number of sick days taken, on average.

Both models show a statistically significant positive correlation between distance to work and likelihood of taking sick leave or an increase in the number of days of sick leave. An increase of one mile in the distance to work leads to a 1.3% point increase in probability of taking sick leave according to the probit model. Similarly, the tobit model predicts an increase of 0.2 days of sick leave taken, on average. This effect fades very slowly the greater the distance, as shown by the squared distance variable, meaning that each further increase in the distance yields slightly smaller effects. Based on the coefficients for distance and its quadratic value in the tobit model, the greater the distance from work the greater the number of sick days up to a distance of 15 miles.

In terms of other job characteristics, the estimation results show there was no significant effect of wage in either models. There was some evidence that having a permanent contract was positively associated with taking sick leave, however this was not captured in the tobit model. Longer hours worked also had a positive association with sick leave in the tobit model as an increase of 1% in hours worked increased the average number of days of sick leave taken by almost 1.2. However, there was not a significant relationship in the probit model.

There was no evidence of association of domestic workers' gender, ethnicity, being disabled or the number of other jobs they had and sick leave. From the Individual Employers (IE) perspective, funding the payment of PAs through NHS's PHB

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TABLE 3 Estimation results.

Variable	Probit (ME)	Tobit (sick days)
Basic pay rate (log)	0.156 (0.129)	3.712 (2.443)
Distance from work (miles)	0.0135*** (0.005)	0.231*** (0.088)
Distance (squared)	−0.000*** (0.000)	−0.008** (0.003)
Permanent contract (yes)	0.098* (0.059)	1.333 (1.199)
More than one job (yes)	−0.031 (0.035)	−0.980 (0.649)
Years in the role	0.016 (0.001)	0.294 (0.219)
Years in the role (squared)	−0.001 (0.001)	−0.024 (0.017)
Fixed hours (yes)	0.041 (0.051)	0.898 (0.990)
Hours worked (log)	0.033 (0.021)	1.168*** (0.374)
Female (yes)	0.053 (0.042)	0.941 (0.895)
PA disability (yes)	−0.068 (0.070)	−0.857 (1.261)
Ethnicity (non-white)	0.040 (0.053)	0.796 (1.040)
Age	0.006 (0.007)	0.088 (0.136)
Age (squared)	−0.000 (0.000)	−0.02 (0.002)
More than one type of support need (IE)	0.017 (0.033)	0.089 (0.647)
IE learning disability (yes)	−0.011 (0.048)	0.022 (0.799)
Funding (ref: direct payment)		
Personal Health Budget	−0.081 (0.058)	−1.861* (1.080)
Self-funded	0.016 (0.042)	−0.206 (0.782)
Total number of PAs employed	0.029*** (0.007)	0.511*** (0.160)
IE is 65 years or older	−0.037 (0.025)	−0.287 (0.489)
JSA allowance (rate of uptake)	−0.007 (0.049)	−0.692 (0.880)
Total # home care providers	−0.002*** (0.001)	−0.037*** (0.012)
Total # of Care Homes	0.001*** (0.000)	0.014** (0.005)
Constant		−18.498
Pseudo R^2	0.075	0.032
Observations	1,016	1,016

ME, Marginal effects; IE, Individual employer; PA, Personal Assistant; JSA, Job Seekers Allowance—unemployment benefit. Local Authority clustered standard errors are in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Model includes controls for region.

TABLE 4 Multilevel estimation results.

Variable	Probit (ME)	Tobit (sick days)
Basic pay rate (log)	0.205 (0.128)	4.451* (2.400)
Distance from work (miles)	0.014*** (0.005)	0.243*** (0.085)
Distance (squared)	−0.000*** (0.000)	−0.008*** (0.003)
Permanent contract (yes)	0.095 (0.060)	1.286 (1.194)
More than one job (yes)	−0.037 (0.035)	−1.076* (0.639)
Years in the role	−0.017 (0.011)	0.296 (0.217)
Years in the role (squared)	−0.001* (0.001)	−0.024 (0.016)
Fixed hours (yes)	0.044 (0.050)	0.889* (0.973)
Hours worked (log)	0.033 (0.020)	1.148*** (0.365)
Female (yes)	0.054 (0.042)	0.905 (0.896)
PA disability (yes)	−0.071 (0.070)	−0.924 (1.272)
Ethnicity (non-white)	0.039 (0.047)	0.876 (0.941)
Age	0.006 (0.007)	0.093 (0.137)
Age (squared)	−0.000 (0.007)	−0.002 (0.002)
More than one type of support need (IE)	0.016 (0.033)	0.112 (0.651)
IE learning disability (yes)	−0.014 (0.048)	−0.030 (0.798)
Funding (ref: direct payment)		
Personal Health Budget	−0.085 (0.058)	−1.961* (1.086)
Self-funded	0.018 (0.041)	−0.233 (0.781)
Total number of PAs employed	0.031*** (0.007)	0.520*** (0.161)
IE is 65 years or older	−0.043* (0.025)	−0.383 (0.470)
JSA allowance (rate of uptake)	−0.066 (0.046)	−1.498 (0.787)
Total # home care providers	−0.002*** (0.000)	−0.025* (0.010)
Total # of care homes	0.001*** (0.000)	0.009* (0.005)
Constant		−18.476
Wald test	104.91***	93.73***
Pr>Chi^2	0.000	0.000
Variance across LAs (_constant)	1.9e^{-33}	6.6e^{-33}

ME, Marginal effects; IE, Individual employer; PA, Personal Assistant; JSA, Job Seekers Allowance—unemployment benefit. Robust standard errors are in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Both models had 1,016 observations.

seemed to play a role in reducing by 1.9 the number of days of sick leave taken. The number of PAs employed by the IEs also had a noticeable impact on taking sick leave, with each extra employee increasing the chances by 2.9% in the probit model, and by 0.5 days of sick leave in the tobit model.

Taking into account Local Authority (LA) characteristics, the unemployment rate was shown to have a negative association with absenteeism, but in neither model was this association significant. There was also evidence that the number of home care providers had a significant negative association with sick leave.

The results of the multi-level models, which allowed for variation in probability of sick leave and sick days by LA, are reported in Table 4. We found that the variation between LAs in probability of taking sick leave and sick days to be above zero but extremely small (< 0.001%) and did not alter the main findings from the linear models. Additionally, in the multi-level tobit model, we found weak evidence for sick days having an association with both hourly wage and local unemployment. Finally, as a robustness check, we allowed distance to vary in size of effect across LAs. We again found very little difference in the size of effect of distance on probability of sick leave and sick days across LAs (< 0.001% variance).

Discussion

Quantitative findings, limitations and strengths

We used the Skills for Care survey of Individual Employers and Personal Assistants collected in 2019 in England to explore the reasons for PA sick leave. Data was available for more than 2,000 PAs and included information on their employers' funding and needs. We used linear and multi-level models to estimate both the probability of taking sick leave and the number of sick days a PA had. This article fills a gap in the literature by providing empirical evidence using econometric methods in a topic that has tended to be researched using qualitative methods.

Our results provide evidence that PAs' job, employer and local area characteristics all affected taking sick leave. We found that PAs who had a permanent contract were more likely to take sick leave. A possible explanation is that by having a permanent contract the employees have better job security and feel more able to take sick leave or potentially a permanent contract may have better working conditions attached to it such as (paid) sick leave.

There was a significant association indicating that IEs using PHBs to pay their PAs faced lower absenteeism from their employees. This evidence is weak and differs from the analysis of Gousia and Allan (25) on turnover using the same SfC survey. As discussed by the authors of that study, people receiving PHB have additional health care needs on top of social care needs, which makes it more difficult to find PAs with the proper mix of skills leading to higher turnover/vacancies. However, the results presented here suggest that even though this might be the case, once there is a good match between PAs and IEs then the absenteeism is lower as a reflection of that good match. It could also indicate greater job satisfaction from greater training opportunities/increased skills in dealing with health related tasks.

Looking into local characteristics, a negative association between unemployment rate and absenteeism only found to be weakly significant in one model. Previous literature has generally found a negative association between unemployment and turnover (25, 49–51). Exploring further local characteristics, our results did indicate that greater availability of home care providers reduced absenteeism. This result could indicate that PAs have to consider a potential substitution effect from too much absence, i.e. independent employers utilizing home care agencies with their direct payments instead. If so, this will likely be a better measure of alternative care provision for employers than local unemployment rates. Conversely, the number of local care homes had a small but positive association with sick leave, similar to results from a previous study (25). This finding suggests care homes act as a potential alternative employer for PAs.

Besides the results discussed previously in this section, our results showed a strong positive association between the distances that PAs have to travel to work, the number of PAs hired by IEs and increased absenteeism. Travel time to work can be seen as a measure of job quality and satisfaction, so longer distances might contribute to lower job satisfaction, while the greater number of PAs employed could be indicative of a caring motive, with PAs looking to avoid leaving the IE without care.

We also found weak evidence in one model of sick days that higher basic pay is positively associated with taking sick leave. This could indicate that PAs on better wages are more able to take sick leave or is a proxy for overall better pay, potentially including sick pay. However, one of the limitations in our study is that we were not able to control for unobserved heterogeneity and this might be the reason why we did not find a strong relationship between basic pay and taking sick leave as found in another study (46). Future research could look to extend this work utilizing appropriate methods to address this. Another limitation is the question regarding how representative is the sample used in our study. Despite our average profile for PAs matching with small samples from other studies discussed previously, the lack of other independent sources of large datasets on PAs hinders our assertion that the sample used in this study is representative and this could potentially affect the results found. However, we noted above that the survey had good coverage of PAs across the country and is the best source of information currently available.

Involvement of research advisors

This study had the active involvement of two research advisors: Eleni Chambers (EC) and Debs Smith (DS). Following the project start in June 2021, EC and DS responded to an advert for advisor involvement that was sent to members of the PSSRU Public Involvement Research Advisor Network (PIRAN) group. Both EC and DS joined the study team shortly afterwards. There have been several meetings during the course of the study where, as people with lived experience of the subject, EC and DS have commented on the aims and methods of the study, provided lay interpretation to the results and been involved in dissemination activities. The study followed the National Institute for Health and Care Research (NIHR) Center for Engagement and Dissemination (CED) guidelines on pay and other practicalities (52).

During a first meeting to introduce the study, we discussed how the research advisors would best like to be further involved in the project, subject to budget constraints. Both advisors were keen to be involved in dissemination of findings. In a follow-up meeting on research advisor participation in dissemination, EC and DS had a preference for working as co-authors on a journal article of study findings. We discussed the different ways in which they could be involved in providing input as

co-authors and a preferred methodology was developed where both research advisors would reflect on the findings of the study through reflective answers to questions posed on the study findings by the rest of the study team. This discussion had the primary aim of providing a local and national context to the findings given their limited knowledge of international long-term care. In addition to this discussion, EC and DS also read and provided comments on all sections of the paper.

Overall, EC and DS contributed to the study by providing a real-life context and previous research advisor experience which (1) enabled the study team to critically assess and alter the preliminary model of sick leave; (2) helped in interpreting and dissemination of findings; and (3) further developed study team members' skills and knowledge of involving those with lived experience in research.

Research advisor reflection on study findings

- **What is your lived experience of social care?**

EC: I have used LTC services and had a Direct Payment since 2009. I initially used Council provided services, then private agencies and since 2015 have employed Personal Assistants (PAs). Even though there is more work for me to do, in terms of the recruitment and selection, training of PAs and paperwork involved in managing them, I much prefer being an individual employer because it affords me greater choice and control.

DS: I have for a number of years supported someone who has employed a personal assistant and they have paid for that PA through direct payments they receive. Before they were awarded direct payments they had had a short time of carers who were sent from a care agency that the social care providers used. This meant having no continuity and was difficult. As it so happens there was a time when the long term health conditions I have meant that I had care in this way too.

- **What was your involvement in this study?**

EC: Debs (DS) and myself have been involved in this study since June 2021. We have discussed and commented on the aims of the study, assisted with interpreting the results and been involved in dissemination. We've had an opportunity to be involved in other areas, this article for example, and I've appreciated the flexibility of the research team and their commitment to involvement.

DS: I have given a lot of support as an informal carer to my friend in recruiting and employing over time now 4 PAs and it had not been easy. It was as a result of this experience that I got I involved in this study as someone with lived experience of the subject and I have worked as an advisor in this capacity on the study having a number of meetings with the researchers and learning about the study and its results and using my lived experience to reflect and guide the study and make comments on its findings.

- **How do the findings of this study fit with your experience of the employment of personal assistants?**

EC: I always employ at least two PAs which enables one to cover for the other during periods of sickness or holidays. My Direct Payment is only relatively small so they both only work a few hours each week and because of this I tend to recruit students as I find that these hours fit well round their studies and I am able to be flexible regarding the days they work. Sometimes PAs are studying a Health and Social Care course so working as a PA provides them with valuable work experience in a related field. Usually, PAs stay for 2 or 3 years with me, often until their course ends, although some people have stayed longer.

As most of my PAs don't have cars themselves, how far away they live has always been an influential factor. Most of them have used public transport and a convenient bus route has always been helpful. Some have used the journey to and from work as an opportunity for exercise—several have cycled into work and some have walked. In my experience distance to work is certainly important as this study found, however, it is also important to take into account related issues such as convenience of transport and personal preferences of PAs. My PAs have been of different genders, ethnicities and several have had disabilities or long term health conditions. I have noticed no correlation with these and sick leave. I have always used a permanent contract and pay above the hourly rate that my local Council recommends. Most of my PAs have worked no more than 8 hours/week and have been with me no longer than 3 years. Some have had other jobs, including PA roles with other people. I have observed no association between any of these factors and sick leave.

DS: The findings of the study do mirror quite a bit what has happened with the PAs my friend has had. The main difficulty has been recruiting people who lived locally and who could do the hours that for which my friend had funding. Another difficulty was my friend not coping with all the paper work that needed to be done and having to get permission for me to do it for her. I feel that now we have these results from a robust research study we need to use them to make changes to the way PAs are viewed, trained and employed.

- **How can these findings help with the recruitment and retention of personal assistants?**

EC: What seems most important to me when employing PAs is providing good working conditions—this includes developing and maintaining a positive culture of trust, respect, integrity, equality and flexibility. Where possible, I also try to tailor the work that each PA does to fit in with their skills and interests.

DS: If there were more funding per hour for the PAs, if they had more time with people for the work they had to do and there was a way of them being trained that could equip them in time to progress to other jobs then this would reduce the stress on PAs generally and help them feel more valued. This would also help them feel more valued and could well lead to less sickness and absenteeism.

- **What more can be done to help the recruitment and retention of personal assistants?**

EC: As always, local and national government can enable greater flexibility in how personal budgets, including the employment of PAs, can be spent—I find myself restricted at times in what I am allowed to spend the budget on. Not only that, PAs could be carrying out more interesting and varied tasks but are not able to do that at present due to restrictions.

The lack of support for IEs is often an issue. My local Disabled People's User Led Organization (DPULO) facilitates some excellent training and support initiatives, and they also enable me to meet other people with personal budgets—arch to explore these factors in greater depth. I would particularly like to see research led by disabled people themselves or co-produced with academics, and also greater use made of gray literature.

DS: The other thing that policy makers need to look at to help with this problem is giving much more support to those who need PAs, or their loved ones, in the process of recruiting and employing the PAs generally. That way we can ensure that we get the right people into the jobs of PAs and that those unsuited to the role are not employed, as the inexperience of service users and their loved ones in doing the recruiting and employing of PAs in the first place could be contributing to the problem of sickness and absenteeism. I would recommend further more qualitative research is done where PAs and their employers can be interviewed to try and find out what number of those involved in these positions say lies behind the sickness and absenteeism of PAs and what could be done about it. I would also recommend that future studies look at what happens in a number of other countries to see what can be learnt from them.

Conclusion

This study looked into the factors associated with work absenteeism of PAs in England. This market has flourished since legislation passed in recent decades allowed LTC users to hire assistants directly, leading to a growth in the number of PAs in England. Similarly, in other countries, the aging population and the increasing need to address LTC demands will most likely see an increase in the size of that market in the coming years and decades, highlighting the importance of understanding the reasons why PAs take sick leave from work, as it might be an indicator of future turnover and vacancies which are known to be associated with poorer outcomes for LTC users.

Using data from a survey of PAs, which included personal, job and employer information, we found evidence that job characteristics, such as travel distance to work and hours of work, and local area characteristics including social care supply, had significant associations with taking sick leave.

These findings have important policy implications for long-term care and for the recruitment and retention of domestic care workers in particular. The results indicated strong evidence of the local nature of the market for PAs, with travel distance to work and local economy factors (alternative LTC employers/providers) significantly influencing the likelihood of a PA taking sick leave. This provides policymakers with evidence that local issues can influence employment in LTC and that policy should be locally focused. For example, having an easy to access public transport service might play a role in promoting PA recruitment and retention, and this may particularly apply to rural areas. Additionally, a recruitment strategy that works in a neighborhood or town with low social care employment may not work in a neighboring location with high social care employment. Linked to the above, we also found evidence of the interlinked nature of employment in LTC. Recruitment and retention strategies could look to utilize this evidence to promote careers in LTC, e.g. encouraging students to work as PAs with a clear career path available beyond this as they graduate and begin full-time employment. Overall, the results found are an attempt to fill a gap in the literature regarding absenteeism of PAs in England and elsewhere, a stepping-stone for future studies with more complete datasets and robust estimation strategies, and also qualitative studies that can disentangle the effects found.

Our study also had active involvement of two research advisors with first-hand experience of social care use who contributed with a real-life context of PA recruitment and retention issues and previous experience as research advisors. The discussion of results in the light of this experience was confirmed with anecdotal impressions, providing explanations to the results and pathways to explore in the future. A potential limitation to this section was that we could not include the views of a PA and this would be something to add to future work in this area. Nonetheless, the participation of people with lived experience of employing PAs in this study was innovative and shows a commitment to integrate academic studies with its stakeholders in accordance with NIHR guidelines (53), facilitating guidance on the direction of research, the dissemination of knowledge and the debate regarding public policies and personal initiatives that are best tailored to the individuals who need it.

Data availability statement

The data analyzed in this study is subject to the following licenses/restrictions: The Individual

Employer and Personal Assistants survey 2019 dataset is available upon request to the Skills for Care organization. Requests to access these datasets should be directed to Skills for Care, analysis@skillsforcare.org.uk.

Author contributions

Conceptualization of research and review of manuscript draft: DR, SA, EC, DS, and KG. Methodology development and data analysis: DR and SA. Data cleaning: DR and KG. Original manuscript draft: DR, SA, EC, and DS. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2022.970370/full#supplementary-material

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Recruitment, retention and employment growth in the long-term care sector in England

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This paper studies the relationship between turnover, hiring and employment growth in the long-term care (LTC) sector in England and sheds light on how challenges in both recruitment and retention affect the sector's ability to meet growing demand for care services. Using the Adult Social Care Workforce Data Set (ASC-WDS), a large longitudinal dataset of LTC establishments in England, and fixed effects estimation methods we: (a) quantify the relationship between the in/outflow of care workers and the expansion/contraction of employment within establishments, (b) establish the role of staff retention policy for workforce expansion, and (c) identify the role of recruitment frictions and its impact on hiring and employment contraction. Our analysis indicates that care worker turnover and employment growth are negatively related. A one percentage point increase in employment contraction is associated with a 0.71 percentage point rise in turnover, while a one percentage point increase in employment expansion is associated with a 0.23 percentage point fall in turnover. In contrast, we find that hiring rates and employment growth are positively related. A one percentage point increase in employment expansion is associated with a 0.76 percentage point rise in hiring, while a one percentage point increase in employment contraction is associated with a 0.26 percentage point decrease in hiring. We argue that the negative turnover-employment growth relationship within expanding establishments provides evidence that better staff retention is associated with higher employment growth. Using information on establishments' annual change in vacancies, and controlling for changes in new labor demand, we also find rising year-on-year vacancies amongst establishments with declining employment. This provides evidence that recruitment frictions drive the declining rate of replacement hiring amongst contracting establishments. Across sectors, we find that the employment growth-turnover and the employment decline-hiring relationships are relatively stronger in the private and voluntary sectors compared to the public sector, suggesting that the impact of staff retention and recruitment frictions on employment is more acute in these sectors.

KEYWORDS

long-term care, recruitment, retention, employment growth, England, turnover, hiring

Introduction

Long-term demographic trends (i.e., an aging society and the increase in life expectancy of people with disabilities) in many developed countries imply that the demand for long-term care (LTC) services will continue to increase. A key input for providing these services is labor. In England, around 1.7 million people work in the adult LTC sector (1). Nevertheless, recent estimates suggest that this workforce needs to grow by an additional 29 per cent (490,000 jobs) by 2035 in order to keep up with the increasing demand (1). Within this wider context, the LTC sector in England faces significant workforce-related challenges in keeping up with the increased demand pressure.

Two key challenges are workforce recruitment and retention. The size of the LTC workforce at any point in time reflects the outcome of continuous inflows and outflows of workers. Existing studies on LTC workforce issues have focussed relatively more on outflows, in particular, on measures of staff turnover and retention rates. Staff turnover rates capture the share of existing workers leaving an employer over a given period while retention rates capture an employer's ability to retain the same staff (2). Studies of turnover rates in the LTC sector have provided valuable insights and highlighted their association with factors such as ownership structure (3–5), management style (6, 7), job satisfaction and employment conditions (8, 9). Related work has also found that staff turnover is associated with quality of care measures (2, 10–14). Nevertheless, turnover forms only part of the picture because the impact of staff turnover on the care workforce is mediated by care providers' ability to replace leavers through recruitment.

Recruitment in the LTC sector has received less attention. This partly reflects the fact that recruitment information is not typically available in the survey datasets used to study the LTC workforce—e.g., the Ohio Biennial Survey of LTC facilities (4, 5) and survey of nursing home administrators (2, 15). In addition, unlike turnover and retention rates, there seems to be less consensus on appropriate measures for capturing difficulties in staff recruitment. Most existing studies typically focus on vacancy rates, which measure the share of unfilled positions as a share of total filled and unfilled positions at a point in time. Except for a slight decrease between 2019 and 2021, vacancy rates in the LTC sector in England have increased steadily from 4.4 to 7.5 per cent between 2013 and 2019 (1). Furthermore, vacancy rates in the LTC sector are high relative to the U.K. economy-wide vacancy rate (2.1 per cent). These statistics suggest that the LTC sector faces exceptional challenges in meeting its workforce requirements and that these problems have been persistent and growing over time.

Broadly, low pay levels (often at minimum wage), lack of status (as care work is not recognized as a profession), and limited opportunities for career progression have been identified as factors contributing to recruitment difficulties (16–19). At a more granular level, studies have found differences in vacancy rates across care settings (1, 20) and geographies (20, 21). Moreover, vacancy rates have been found to be increasing with the share of employees on zero-hours contracts and the average days of sick leave per employee (9). Nonetheless, job vacancy rates provide only a snapshot of the number of unfilled positions and do not inform about the extent of deeper recruitment issues.

This paper studies the relationship between turnover, hiring and employment growth and their implications for the LTC sector's ability to maintain a care workforce able to meet rising demand. To do so, we proceed in three steps. First, we use longitudinal data on LTC establishments and workers in England and panel fixed effect regression methods to quantify the relationship between the in/outflow of care workers and the expansion/contraction of employment at LTC establishments. Second, focusing on establishments with expanding employment, we analyze the relative contributions of staff inflow (i.e., hiring) and outflow (i.e., turnover) to employment growth and establish the role of staff retention in workforce expansion. Third, focusing on establishments with contracting employment, we analyze year-on-year changes in establishments' vacancies and identify the role of recruitment frictions and its impact on hiring and employment contraction.

We find a negative relationship between care worker turnover and employment growth along the growth distribution. Our estimates imply that a one percentage point increase in employment decline is associated with a 0.71 percentage point rise in turnover rate, while a one percentage point increase in employment growth is associated with a 0.23 percentage point fall in turnover rate. In other words, establishments that are contracting (expanding) more rapidly have a higher (lower) share of workers leaving.

Turning to hiring, we find a positive relationship between hiring rates and employment growth along the growth distribution. Our estimates imply that a one percentage point increase in annual care worker employment is associated with a 0.76 percentage point increase in hiring, while a one percentage point decrease in year-on-year employment is associated with a 0.26 percentage point decrease in hiring. That is, establishments that are growing more rapidly tend to hire new care workers at a faster rate and establishments that are contracting more rapidly tend to hire replacements at a lower rate.

We argue that our findings suggest that staff retention policies (i.e., measures which reduce the rate at which staff leave an establishment) are important for expanding employment. Intuitively, an establishment's care workforce can expand due to a combination of more rapid hiring or reduced staff turnover. If staff retention policy were indeed irrelevant for employment growth, then we would expect turnover to be constant or even increasing as establishments expand more rapidly, and hiring to increase at least one-for-one with employment growth. Instead, we find that more rapid employment growth is

systematically associated with reduced staff turnover and a less than one-for-one increase in hiring rates. Together, these suggest that employment expansion in the LTC sector, in general, involves both increasing the inflow of workers through hiring and moderating the outflow of workers through better staff retention.

To understand why establishments with contracting employment have lower rates of hiring, we use a new measure, namely the annual change in vacancies, along with information on employment and care service utilization to isolate the effect of frictions in recruitment. In this way, we can test whether the decrease in hiring amongst contracting establishments reflects intentional downsizing policies or if difficulties in recruitment are instead the key contributor. Intuitively, since each new vacancy represents effort to fill an unfilled position, if contracting employers were indeed intentionally reducing hiring to downsize, then, after controlling for changes in labor demand, we should not see a year-on-year increase in vacancies. We find that amongst establishments with contracting employment, a one percentage point increase in employment decline is associated with an increase of 1.15 unfilled vacancies. This finding contradicts the competing claim that the employment declines we observe are purely due to intentional downsizing.

Materials and methods

Data

We used data from the Adult Social Care Workforce Data Set (ASC-WDS), the leading source of LTC workforce intelligence in England. The dataset is managed by Skills for Care and includes information on over 20,000 LTC establishments and over 700,000 workers, covering about 50 per cent of the LTC market. The information is rich at both establishment (e.g., type of service provided, sector, establishment size, count of employees and job roles, starters, leavers and vacancies, etc.) and worker level (e.g., age, gender, nationality, qualifications, pay, working hours, job role and job type). Public LTC employers update their data on a mandatory basis in September each year. Independent employers submit data on a voluntary basis, but are incentivised to do so by access to workforce development grants. All data in the ASC-WDS have been updated or confirmed to be up to date within the last 2 years, and about 80 per cent of employers have updated their data in the past 6 months. Although the dataset does not cover all independent sector establishments, it does have a large enough sample to provide a solid basis for reliable workforce estimates at both national and local level. All ASC-WDS data have been validated at source and have undergone rigorous quality checks (1, 22).

We used data from four cuts of the ASC-WDS: October 2016, October 2017, October 2018, and October 2019, matched at establishment level, and with some variables generated from the worker dataset (e.g., mean age, mean female rate, mean hourly wage, share of staff on zero-hours contracts, etc.). Skills for Care assigns to each establishment a unique and permanent ID. We excluded establishments who did not update their records for more than 6 months. We kept establishments providing either care home services (with or without nursing) or domiciliary care to adults (i.e., service users aged 18 and over). Public sector (i.e., statutory local authority), private (i.e., for-profit), and voluntary (i.e., not-for-profit) sector providers were all included. In addition, we restricted our sample to establishments present in the dataset for at least 2 consecutive years, and which reported having employed care workers on a permanent or temporary contract in at least the first year. After excluding observations with missing values for required variables, the resulting unbalanced panel contains 10,773 establishment-year observations corresponding to 4,199 unique establishments.

Due to the sample selection criteria, we do not expect our analysis sample to be fully representative of the English LTC sector. For example, the need for consecutive observations precludes start-ups in 2019 and closures in 2016. Furthermore, we would also expect public sector establishments to be over-represented due to the sampling structure of the ASC-WDS. To gauge the representativeness of our analysis sample, we computed sampling weights for each observation. These weights, calibrated by the raking procedure, target care setting $\times$ year specific totals obtained from the Care Quality Commission (CQC) directory. Table A2 compares the summary statistics of the variables in our model based on weighted and unweighted data. Overall, this method suggests that our sample over-represents residential care establishments, public sector establishments and those with "Good/Outstanding" CQC quality ratings. Despite these differences, robustness checks show that our main results remain largely unaffected after accounting for sample representativeness through weighting.

Worker flow rates, employment growth rates and vacancies

The ASC-WDS contains, for each job role, information on the stock of permanent and temporary staff, the number of staff that left, and the number of staff that started work in the previous 12 months. We define an establishment's annual care worker turnover rate at time t as the reported number of care workers that left the establishment divided by the average stock of care workers employed at $t-1$ and t. Similarly, we define an establishment's annual care worker hiring rate at time t as the reported number of starters divided by the average stock of care workers employed at $t-1$ and t. Finally, we define an establishment's annual care worker employment growth rate as the difference in the stock of care workers between $t-1$

and t divided by the average number of care workers employed at these two times. The approach of normalizing flow rates by the average employment between two time points follows the literature on job and worker flows (23–26). The ASC-WDS also contains information on the number of staff vacancies for care worker roles at the time of the last update, and we use this to define the establishment's annual change in care worker vacancies, i.e., as the reported number of vacancies at t minus the reported number at $t-1$.

Econometric model

We assume that establishment-level worker flows are related to employment growth via the following additive-linear form:

$$y_{it} = \gamma(g_{it}) + x_{it}^{'}\beta + \alpha_i + \delta_t + \varepsilon_{it} \quad (1)$$

where the dependent variable, y_{it}, is either the turnover rate or hiring rate of establishment i in year t, α_i represents time-invariant unobserved establishment-level heterogeneity, δ_t aggregate time effects, x_{it} is a set of non-growth explanatory variables and ε_{it} is an idiosyncratic error term. g_{it} is the growth rate of employment in year t while the function $\gamma(g)$ describes the relationship between employment growth and worker flows. The latter relationship could be non-linear and non-monotonic in general. The objective of our statistical analysis is to quantify the relationship between job and worker flows as encapsulated in $\gamma(g)$.

Early studies have used parametric specifications of Equation (1) to examine the relationship between job and worker flows in the Danish manufacturing sector (27) and the U.S. (28). More recent studies also estimated non-parametric versions of this specification in a variety of contexts (24, 25, 29, 30). For our descriptive analysis, we allow for non-parametric relationships between job and worker flows. To enable a more straightforward interpretation, our regression analysis will use a simple piecewise linear form. Specifically, let $I(g_{it} > 0)$ be an indicator for strictly positive employment growth and $I(g_{it} < 0)$ for strictly negative growth. We estimate the following model using fixed-effects panel regression.

$$y_{it} = \gamma^{+} g_{it} \bullet I(g_{it} > 0) + \gamma^{-} g_{it} \bullet I(g_{it} < 0) + x_{it}^{'}\beta + \alpha_i + \delta_t + \varepsilon_{it} \quad (2)$$

Equation (2) allows for the relationship between growth and worker flows to differ between expanding and contracting establishments but assumes that the relationship is linear within each group. This modeling choice balances flexibility against interpretability of the resulting regression estimates and is broadly consistent with descriptive graphical representations of the data. Nonetheless, we assess the sensitivity of our findings with respect to this functional form assumption in our robustness analysis.

x_{it} contains a rich set of time-varying covariates. These include dummy variable interactions for care setting and year, sector and year and local area and year. Year dummies, δ_t, capture aggregate socio-economic changes that affect hiring and separations, while the care setting × year and sector × year interactions capture policy and sectoral shifts. We define a local area to be one of the 150 Councils with Adult Social Services Responsibilities (CASSRs) in England and include local area × year interactions to capture the heterogeneity of local labor markets in England. Our full covariate specification also includes: the overall quality rating by the CQC (England's independent health and LTC regulator), local market conditions (unemployment rate, mean hourly wage in the lowest quartile, average house prices, care home competition index), establishment size and staffing (total employment and the ratio of direct care workers to service users), remuneration policies (mean hourly wage of care workers and share of workers on zero-hours contracts), type of care users (dummies for dementia and mental disorders), staff training (share of workers who have completed dementia care and Dignity, Respect & Person Centred care training). Detailed definitions of the variables used in our model are listed in Table A1.

Following existing work on the LTC workforce which has found that the stability of the direct care workforce in an establishment is positively correlated with the stability of its managerial staff (4, 15, 21), we further account for managerial staff stability in the form of managerial turnover in our regression model. In this regard, contemporaneous managerial turnover is likely to be endogenous since both care worker and manager separations over a given period could be driven by an unobserved establishment-level shock, such as organizational restructuring. As such, we instead use 1 year lagged managerial turnover rates as a proxy for managerial staff stability. Because turnover at reporting time t captures the number of leavers between $t-1$ and t, our specification captures how managerial staff stability between $t-2$ and $t-1$ affects care worker separations and hires between $t-1$ and t.

Results

Descriptive statistics

Table 1 reports the summary statistics of the dependent variables and covariates used in our analysis sample. To examine if there are any systematic differences in these characteristics between establishments with expanding, contracting and stable employment, the last three columns report the mean values

of these variables by employment growth category. About 18 per cent of establishment-year observations have zero change in annual care worker employment with the remaining split between contracting (43 per cent) and expanding establishments (39 per cent). Average employment growth rates amongst the latter two groups are very close in magnitude (around −22.0 per cent and +22.3 per cent respectively), resulting in an aggregate employment growth rate close to zero. Turning to establishment-level characteristics, the statistics imply that 2 year average employment is higher amongst expanding and contracting establishments compared to those with stable employment. However, beyond employment levels, there do not appear to be systematic differences in establishment-level characteristics between establishments in the three groups. Finally, the mean values of the dependent variables reported in Table 1 indicate that on average, turnover rates are higher in establishments with declining employment followed by those with increasing employment and then zero growth establishments. In contrast, hiring rates are higher in expanding establishments, followed by contracting establishments and establishments with zero growth. With respect to vacancies, the average annual change is highest amongst establishments with declining employment followed by those with zero growth and then those with increasing employment.

Table 2 reports the mean turnover, hiring and vacancy rates as well as the annual change in vacancies for each year, care setting and sector. Between 2017 and 2019, average turnover rates increased from 46.3 to 55.0 per cent while average hiring rates increased from 47.2 to 53.7 per cent. Average vacancy rates similarly increased from 4.8 per cent in 2017 to 5.8 per cent in 2019. There appears to be a decrease in average annual change in vacancies from 0.47 in 2017 to 0.05 in 2019. Across care settings, domiciliary care establishments face higher average turnover (63.1 per cent vs. 45.8 per cent), hiring (63.7 per cent vs. 45.6 per cent) and vacancy rates (8.4 per cent vs. 4.4 per cent) compared to residential care establishments. Domiciliary care establishments also experience a larger average year-on-year increase in vacancies relative to residential care establishments (0.60 vs. 0.17). Average employment growth is negative and close to zero in both care settings, with domiciliary care establishments showing slightly less contraction than residential care establishments (−0.5 per cent vs. −0.7 per cent).

Across sectors, private sector establishments experience higher average turnover and hiring rates (55.6 and 55.6 per cent, respectively) compared to voluntary sector (37.2 and 36.0 per cent, respectively) and public sector establishments (20.1 and 22.3 per cent, respectively). Average vacancy rates across all three sectors are relatively close and range from 4.7 per cent for voluntary sector establishments to 5.6 per cent for public and private sector establishments. Despite their similar vacancy rates, the average annual change in vacancies in the public sector differs quite significantly compared to voluntary and private sectors. While private and voluntary sector establishments experience year-on-year increases of 0.31 and 0.25 vacancies on average, public sector establishments report an average year-on-year decrease in vacancies of 0.07 vacancies. The average employment growth of public sector establishments in our sample is also higher than that of voluntary and private sector establishments (2.2 per cent vs. −0.7 per cent and −1.3 per cent, respectively).

Staff turnover and employment growth

Figure 1A plots the non-parametric relationship between turnover and employment growth in the cross-section. To obtain this figure, establishments in the analysis sample are grouped into 100 equally sized bins based on their employment growth rate. Each point then plots the average turnover rate and employment growth rate of that bin. For presentation purposes, the figure omits outliers corresponding to the top and bottom one per cent employment growth and turnover establishments. The figure shows that care worker separations as a share of employment is decreasing over both negative and positive employment growth regions. Amongst contracting establishments, the turnover rate increases almost linearly as the rate of contraction increases. Amongst expanding establishments, the turnover rate appears largely flat at employment growth rates between 0 and 50 per cent but is decreasing at higher growth rates.

Table 3 reports the results from estimating Equation (2) with care worker turnover rate as the dependent variable. Column 1 is a linear version of the relationship presented in Figure 1A. The coefficients for positive and negative employment growth capture the cross-sectional correlation between turnover and employment growth amongst expanding and contracting establishments, respectively, while the constant term is the average turnover rate amongst establishments with stable employment. The estimates show that a one percentage point increase in rate of employment contraction is associated with a 0.90 percentage point rise in care worker turnover rate. Employment expansion, on the other hand, is not statistically related to turnover in this baseline case. The statistically significant constant implies that the average care establishment with no year-on-year change in care worker employment sees four out of 10 employees leave.

Column 2 reports the results from the specification including all covariates except for establishment-level fixed-effects. In this specification, the relationship between employment contraction and turnover is similar in sign and magnitude to Column 1, while the relationship between employment expansion and turnover is now negative and statistically significant. This change in magnitude and statistical significance suggests that systematic differences in turnover across sectors, care settings and other observable establishment characteristics mask some of the relationship

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TABLE 1 Estimation sample summary statistics.

	All care establishments		Negative growth establishments	Zero growth establishments	Positive growth establishments
	Mean	Std Dev.	Mean	Mean	Mean
Turnover rate of care workers	0.503	0.517	0.637	0.369	0.420
Hiring rate of care workers	0.503	0.547	0.427	0.372	0.646
Annual change in care worker vacancies	0.282	4.491	0.574	0.100	0.048
Care worker employment growth rate	−0.006	0.279	−0.220	0.000	0.223
Establishment with positive employment growth	0.391	–	0.000	0.000	1
Establishment with negative employment growth	0.426	–	1	0.000	0.000
Service utilization growth rate	0.009	0.211	−0.010	0.009	0.031
Two-year average total employment	47.634	47.815	50.804	34.025	50.567
Direct care worker to service user ratio	1.665	4.250	1.603	1.563	1.779
Establishment with service users with dementia	0.554	–	0.565	0.488	0.573
Establishment with service users with mental infirmities	0.643	–	0.643	0.671	0.631
Share of workers completed dementia care training	0.258	–	0.261	0.265	0.252
Share of workers completed DRPC training	0.187	–	0.185	0.191	0.186
Mean age of employees	43.182	4.753	43.343	43.921	42.659
Mean years of experience of employees	8.811	3.893	8.831	9.848	8.302
Mean hourly wage of employed care workers	7.761	0.756	7.780	7.695	7.770
Share of care workers on zero-hours contracts	0.171	–	0.182	0.129	0.179
Turnover rate of managers/supervisors	0.320	0.499	0.349	0.237	0.327
CQC (Overall) rating—Inadequate/Req. improvement	0.135	–	0.139	0.109	0.141
CQC (Overall) rating—Good/Outstanding	0.827	–	0.822	0.849	0.822
CQC (Overall) rating—No rating	0.039	–	0.039	0.042	0.037
Residential care	0.741	–	0.722	0.806	0.730
Domiciliary care	0.259	–	0.278	0.194	0.270
Public sector	0.061	–	0.058	0.054	0.067
Private sector	0.770	–	0.775	0.758	0.771
Voluntary sector	0.169	–	0.167	0.188	0.162
Observations	**10,773**		**4,588**	**1,976**	**4,209**

TABLE 2 Worker flows and vacancies across years, care settings and sectors.

	Observations	Turnover rate	Hiring rate	Vacancy rate	Change in vacancies	Employment growth
Pooled	10,773	0.503	0.503	0.054	0.282	−0.006
2017	3,582	0.463	0.472	0.048	0.474	0.005
2018	4,143	0.504	0.505	0.057	0.275	−0.004
2019	3,048	0.550	0.537	0.058	0.045	−0.023
Care setting						
Residential	7,979	0.458	0.456	0.044	0.169	−0.007
Domiciliary	2,794	0.631	0.637	0.084	0.602	−0.005
Sector						
Public sector	653	0.201	0.223	0.056	−0.069	0.022
Private sector	8,297	0.556	0.556	0.056	0.316	−0.007
Voluntary sector	1,823	0.372	0.360	0.047	0.254	−0.013

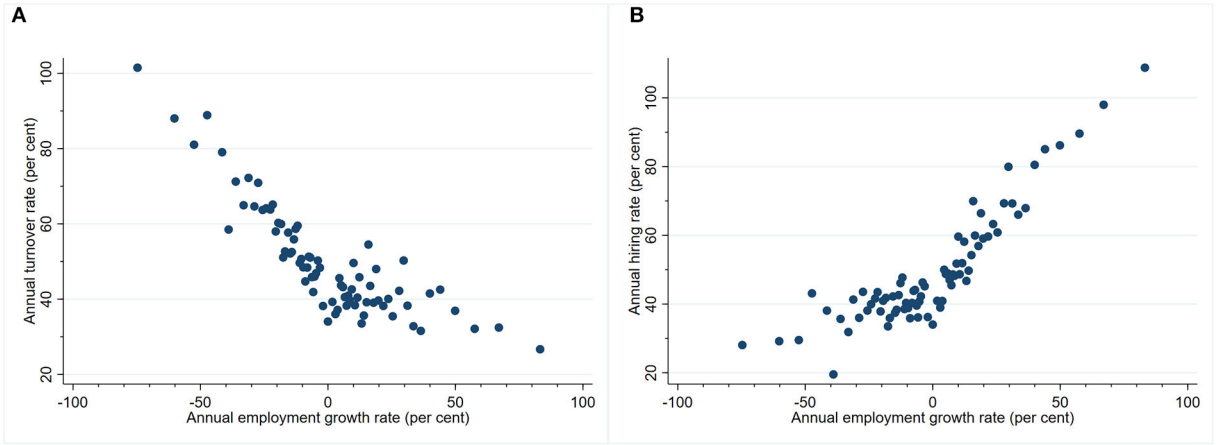

FIGURE 1
(A) Relationship between care worker turnover and employment growth. **(B)** Relationship between care worker hiring and employment growth.

between turnover and employment growth when we look at raw cross-sectional comparisons.

The coefficient estimates from Columns 1 and 2 reflect both the within-establishment relationship between turnover and employment growth and systematic differences across establishments. To isolate the within-establishment relationship, Column 3 adds to the previous specification establishment fixed effects. Controlling for time-invariant establishment-level heterogeneity via establishment fixed-effects leaves the turnover-employment growth relationship qualitatively unchanged but affects its magnitude. The estimates imply that a one percentage point increase in the employment contraction rate is associated with a 0.71 percentage point rise in turnover rate, while a one per cent increase in employment expansion rate is associated with a 0.23 percentage point fall in turnover rate.

To summarize, all three specifications point to a negative relationship between care worker turnover and employment along the entire growth distribution. Comparing across specifications suggests that part of this negative turnover-growth relationship is masked by systematic differences across establishments in both observable (comparing Column 1 with Column 2) and unobservable (Column 1 with Column 3) characteristics. Moreover, the estimates in Column 3 confirm that the negative association applies within establishments and is not an artifact of heterogeneity between establishments. In subsequent sections we integrate the above findings with our results from analyzing hiring to establish the role of staff retention in employment expansion.

Factors affecting turnover

Beyond the turnover-growth relationship, our results also shed light on other factors influencing care worker turnover amongst English care providers. Without controlling for establishment-level fixed-effects (Table 3, Column 2), we find statistically significant and positive coefficient estimates for having service users with dementia, the share of workers trained in dementia care and dignity in care, having a high share (top 25 per cent of sector) of care workers on zero-hours contracts, and turnover of managerial staff. We also find statistically significant negative coefficient estimates for (2 year) average total employment, mean age of employees, average employee years of experience and local area unemployment rate.

However, when controlling for establishment-level heterogeneity many of the relationships become statistically insignificant (Table 3, Column 3). On the one hand, this is to be expected as several variables, such as service user type, average employee age and years of experience, show little to no intertemporal variation within establishments and are hence "absorbed" by the establishment fixed-effects. On the other hand, the fact that coefficients on worker training and prevalence of zero-hours contracts become insignificant suggests that the cross-sectional relationship between these variables and turnover is in fact driven by establishment-level heterogeneity in contracting and training practices. Notably, the coefficient for managerial turnover remains significant at the one per cent level but its magnitude is almost ten times smaller. This suggests that the association between managerial staff stability and direct care staff turnover stems from both managerial staff turnover *per se* and unobserved heterogeneity between care establishments, with the latter having greater influence. Put differently, managerial staff instability and care worker turnover are related through two possible channels: directly, through insufficient supervision or mentorship, and indirectly, through persistent factors reflected by managerial staff stability, such as "organizational culture". In this regard, our results suggest that while both channels of influence

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TABLE 3 Estimation results—turnover rate.

	(1)	(2)	(3)
Positive employment growth (i.e., expansion)	−0.049	−0.137***	−0.231***
	(0.033)	(0.030)	(0.023)
Negative employment growth (i.e., contraction)	−0.895***	−0.827***	−0.713***
	(0.027)	(0.025)	(0.025)
CQC (Overall) rating—Inadequate/Req improv.		−0.008	−0.002
		(0.016)	(0.013)
CQC (Overall) rating—No rating		0.024	0.012
		(0.025)	(0.019)
Two-year average total employment		−0.001***	−0.004***
		(0.000)	(0.001)
Average total employment—squared		0.000**	0.000**
		(0.000)	(0.000)
Direct care worker to service user ratio		0.000	−0.001
		(0.001)	(0.001)
Service users with dementia		0.073***	0.008
		(0.015)	(0.055)
Service users with mental infirmities		0.023	0.030
		(0.014)	(0.071)
Share of workers with dementia care training		0.088***	0.057
		(0.025)	(0.040)
Share of workers with DRPC training		0.044*	0.024
		(0.023)	(0.026)
Log (mean age of employees)		−0.637***	−0.089
		(0.076)	(0.120)
Log (mean experience of employees)		−0.040**	−0.022
		(0.016)	(0.030)
Log (mean hourly wage of care workers)		−0.082	−0.046
		(0.089)	(0.113)
Top quartile share of zero-hours contracts in sector		0.037**	0.006
		(0.019)	(0.020)
Manager/supervisor turnover rate (first lag)		0.280***	0.033***
		(0.019)	(0.011)
Unemployment rate at LAD-level		−0.042***	−0.005
		(0.013)	(0.014)
Log (mean hourly wage) of 1st quartile in LAD		−0.188	0.203
		(0.183)	(0.196)
Log (mean house price) at PCD-level		0.032	−0.027
		(0.028)	(0.081)
Care establishments HHI index at LAD-level		−0.991	−2.778
		(0.645)	(2.978)
Constant	0.424***	3.170***	1.004
	(0.008)	(0.606)	(1.180)
Year FE	No	Yes	Yes
Care Setting × Year FE	No	Yes	Yes
Sector × Year FE	No	Yes	Yes
Local Area × Year FE	No	Yes	Yes
Establishment FE	No	No	Yes
Observations	10,773	10,773	10,773
R-squared	0.095	0.285	0.863
Adj R-squared	0.0948	0.253	0.758

Robust standard errors clustered by Estab. ID in parentheses, ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

are active, the latter appears to account for a larger part of the association between managerial staff stability and care worker turnover.

Hiring rates and employment growth

Figure 1B plots the non-parametric relationship between hiring and employment growth in the cross-section. It shows that new care worker hires as a share of employment is increasing over both negative and positive employment growth regions. The hiring-growth relationship is substantially less steep for contracting establishments and largely flat near the zero-growth region.

Table 4 reports the results from estimating Equation (2) with care worker hiring rate as the dependent variable. As before, the coefficient estimates in Column 1 capture the cross-sectional correlation between hiring and employment growth amongst expanding and contracting establishments, respectively. They imply that a one percentage point increase in employment expansion is associated with a 0.95 percentage point rise in hiring rate. In contrast, a one percentage point increase in employment contraction is associated with a 0.07 percentage point fall in care worker hiring rate. The estimated constant term, which represents the average hiring rate amongst zero-growth establishments, is almost identical to their average turnover rate (Table 3, Column 1). These two estimates together imply that the average care establishment with no year-on-year change in care worker employment sees four out of ten workers leave and replaces them one-for-one by the end of the year. Column 2 reports estimates after controlling for all covariates except for establishment fixed effects. Accounting for observable establishment characteristics reduces the magnitude of correlation between hiring and employment expansion but increases the magnitude of correlation between hiring and employment contraction.

Column 3 adds establishment fixed effects to the specification in Column 2. This allows us to account for unobserved time-invariant heterogeneity across establishments. Furthermore, the coefficients on employment growth in this specification capture the within-establishment relationship between hiring and employment growth. The estimates imply that a one percentage point increase in employment growth is associated with a 0.76 percentage point rise in hiring rate, while a one percentage point increase in employment contraction is associated with a 0.26 percentage point fall in the hiring rate.

To summarize, the three specifications consistently show a positive relationship between care worker hiring and employment growth along the growth distribution. Additionally, the increasing magnitude of correlation between hiring and employment contraction suggests that part of the hiring-growth relationship is masked by systematic differences across establishments in both observable (comparing Column 1 with Column 2) and unobservable (Column 1 with Column 3) characteristics. Because each new hire for a contracting establishment is a replacement hire, our findings imply that establishments with more rapidly decreasing employment also tend to be the ones that are hiring replacements at a lower rate. In our subsequent analysis, we use information on the change in vacancies to understand if this relationship stems from active downsizing or difficulties in recruitment.

The role of staff retention in employment growth

Our findings on the directions and magnitudes of the turnover-employment growth and hiring-employment growth relationships imply that measures which reduce the rate of staff turnover (i.e., staff retention policies), play an important role in employment growth. To see why, first note that the change in employment in a year is always equal to the difference between the number of hires and separations over that same period. Focusing on establishments with positive employment growth, this accounting relation means hiring net of separations must always be positive, but the hiring-growth and separations-growth relationships can be positive or negative in general.

Suppose that staff retention measures were irrelevant for employment growth. Then, we would expect to find either no systematic association between turnover and employment growth rates amongst expanding establishments, or that turnover rates increase with employment growth, as was found in Burgess et al. (28). Moreover, since employment growth must equal the inflow minus outflow of care workers, we would also expect hiring to increase at least one-for-one in employment growth.

In contrast, we consistently find a negative relationship between turnover and employment growth (Table 3) and positive but less than one-to-one relationship between hiring and employment growth (Table 4). These results imply that employment growth amongst LTC providers in England cannot be attributed solely to hiring behavior. Rather, the fact that higher employment growth is systematically associated with decreasing turnover within establishments suggests that better staff retention (and thereby reduced staff turnover) are also important for explaining workforce expansion.

The above arguments are summarized graphically in Figure 2, which plots the non-parametric relationship between hiring, turnover and employment growth, after accounting for establishment-level heterogeneity and calendar year effects. To obtain the figure, we first run regressions of hiring and turnover rates on establishment and year fixed effects, keep the residuals for each observation and add to each the corresponding mean turnover or hiring rate. These mean-adjusted residuals capture hiring and turnover behavior after excluding the systematic

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TABLE 4 Estimation results—hiring rate.

	(1)	(2)	(3)
Positive employment growth (i.e., expansion)	0.947***	0.856***	0.760***
	(0.033)	(0.031)	(0.024)
Negative employment growth (i.e., contraction)	0.068*	0.141***	0.263***
	(0.035)	(0.032)	(0.030)
CQC (Overall) rating—Inadequate/Req improv.		−0.008	−0.000
		(0.017)	(0.014)
CQC (Overall) rating—No rating		0.023	0.013
		(0.026)	(0.021)
Two-year average total employment		−0.001***	−0.004***
		(0.000)	(0.001)
Average total employment—squared		0.000**	0.000**
		(0.000)	(0.000)
Direct care worker to service user ratio		0.000	−0.001
		(0.001)	(0.001)
Service users with dementia		0.076***	0.006
		(0.016)	(0.056)
Service users with mental infirmities (ex. MHA)		0.022	0.027
		(0.015)	(0.073)
Share of workers with dementia care training		0.083***	0.048
		(0.027)	(0.044)
Share of workers with DRPC training		0.044*	0.021
		(0.024)	(0.028)
Log (mean age of employees)		−0.651***	−0.060
		(0.080)	(0.136)
Log (mean experience of employees)		−0.040**	−0.037
		(0.018)	(0.037)
Log (mean hourly wage of care workers)		−0.083	−0.062
		(0.094)	(0.121)
Top quartile share of zero-hours contracts in sector		0.035*	0.003
		(0.020)	(0.020)
Manager/supervisor turnover rate (first lag)		0.300***	0.038***
		(0.021)	(0.012)
Unemployment rate at LAD-level		−0.045***	−0.009
		(0.014)	(0.015)
Log (mean hourly wage) of 1st quartile in LAD		−0.233	0.138
		(0.199)	(0.210)
Log (mean house price) at PCD-level		0.028	−0.038
		(0.030)	(0.085)
Care establishments HHI index at LAD-level		−1.155*	−2.698
		(0.678)	(3.062)
Constant	0.427***	3.402***	1.286
	(0.008)	(0.661)	(1.248)
Year FE	No	Yes	Yes
Care Setting × Year FE	No	Yes	Yes
Sector × Year FE	No	Yes	Yes
Local Area × Year FE	No	Yes	Yes
Establishment FE	No	No	Yes
Observations	10,773	10,773	10,773
R-squared	0.096	0.281	0.862
Adj R-squared	0.096	0.249	0.757

Robust standard errors clustered by Estab. ID in parentheses, ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

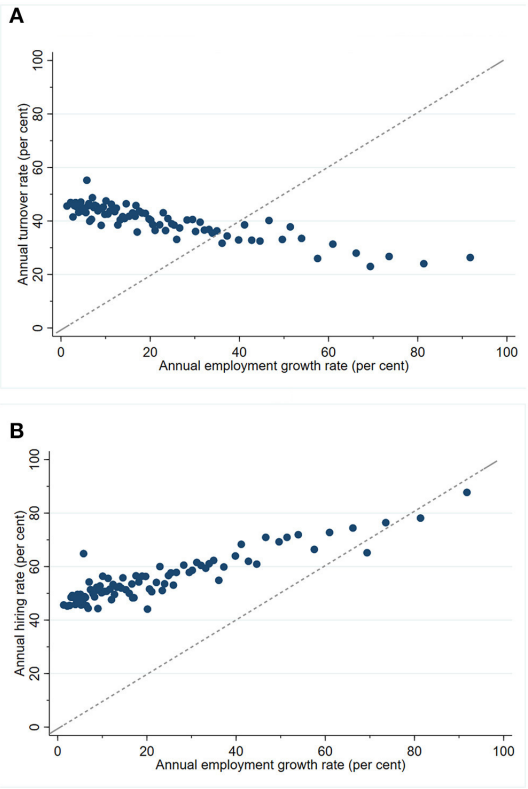

FIGURE 2
(A) Relationship between care worker turnover and employment growth (residualized means). **(B)** Relationship between care worker hiring and employment growth (residualized means).

influence of time-invariant establishment-level heterogeneity and calendar year effects. Focusing on positive employment growth cases, we then plot the binned-scatter plots of residualized mean hiring and turnover rates against employment growth (as with Figure 1).

The key features to note are the downward-sloping locus of points in Panel (A) and the locus of points in Panel (B) which is upward-sloping but flatter than the reference 45-degree line. The former highlights the systematic negative relationship between turnover and employment growth within establishments. The latter shows that the hiring-employment growth relationship within establishments is positive but less than one-to-one.

The role of recruitment frictions in replacement hiring

Our analysis of hiring rates showed that amongst establishments with employment contraction, higher rates of employment decline are associated with increased turnover rates and decreasing hiring rates. In this section, we will argue that recruitment difficulties can explain why hiring rates decrease amongst establishments with more rapid employment contraction. In general, it is possible that contracting establishments intentionally decrease replacement hiring as part of a downsizing policy. However, we argue that difficulties in recruitment (i.e., the inability to fill vacant positions) instead explain the observed relationship between replacement hiring and employment growth.

To make this argument, we use information on the annual change in vacancies. We focus on the change and not the stock of vacancies because the number of vacancies at any point in time consists of both previously existing vacancies that continue to be unfilled (i.e., persistent unmet labor demand) and/or newly posted vacancies (i.e., new labor demand). To disentangle the two factors we use the year-on-year change in the number of vacancies as our dependent variable and relate it to the change in employment (i.e., employment growth). To account for the confounding effect of new labor demand, we use the change in the number of people using an establishment's care services (hereafter "utilization") as its proxy. Since each new vacancy represents an unfilled position (i.e., search for a new hire), if contracting employers were indeed intentionally reducing hiring to downsize, then, after controlling for changes in labor demand, we should not see a year-on-year change in vacancies after controlling for new labor demand.

Figure 3 presents descriptive evidence of the relationship between the annual change in vacancies and employment growth, after accounting for establishment-level heterogeneity and calendar year effects. To obtain this set of figures, we used the procedure described previously to obtain residualized measures of the change in vacancies for each observation. We then split the sample into three groups corresponding to establishments experiencing a decrease, no change or increase in utilization of their care services. Splitting the sample in this manner allows us to account roughly for the confounding effect of new labor demand. For each group, we plot a binned-scatter diagram (similar to Figures 1, 2) to capture the non-parametric relationship between the change in vacancies and employment growth.

There are two noteworthy features across all panels. First, the majority of all points in the negative employment growth region are in the north-west quadrant. Second, there is a negative association between the year-on-year change in unfilled care worker vacancies and employment growth.

The fact that most establishments with declining employment also report an annual rise in the number of vacancies, after accounting for growth in utilization of care services, is inconsistent with the hypothesis that these establishments are intentionally downsizing. Our argument is most evident in Figure 3B, which captures the case with no utilization growth and which shows that almost all establishments with declining employment report an increase in vacancies. Barring the possibility that only this group of contracting establishments anticipate a future jump in demand

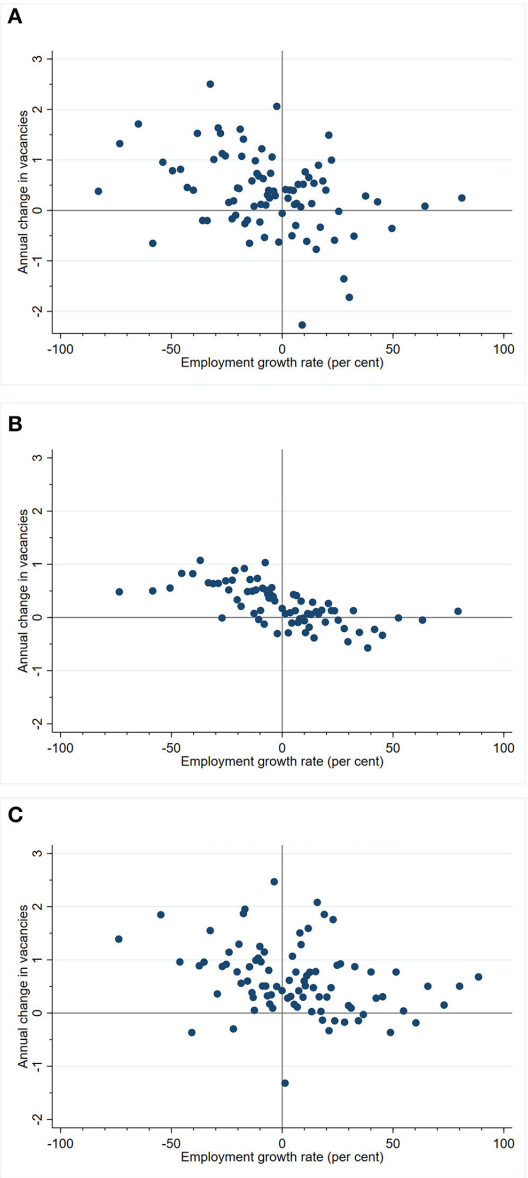

FIGURE 3
Relationship between unfilled vacancies and employment growth: **(A)** Establishments with decrease in service utilization. **(B)** Establishments with no change in service utilization. **(C)** Establishments with increase in service utilization.

for services and hence labor demand, the remaining explanation is that the increase in year-on-year vacancies captures the inability of these establishments to replace employees who have left during the year.

To formalize the above intuition, Table 5 reports the results from estimating Equation (2) with the annual change in care worker vacancies as the dependent variable and additional piece-wise linear controls for positive and negative utilization growth. Our argument boils down to checking the sign of the coefficient on negative employment growth. In particular, the statistically significant negative coefficient on negative employment growth across all specifications implies that establishments with declining employment also systematically experience a year-on-year increase in vacancies. This finding, as we have argued, is inconsistent with the hypothesis that the observed decrease in replacement hiring amongst contracting establishments results from intentional downsizing.

Regarding the magnitudes of our estimates, Column 1, which reports cross-sectional correlations while controlling for growth in utilization of care services, shows that a one percentage point increase in rate of employment contraction is associated with a 1.07 year-on-year rise unfilled vacancies. For expanding establishments, a one percentage point increase in the rate of employment expansion is instead associated with a 0.50 year-on-year decrease in unfilled vacancies. The statistically significant constant term implies that an establishment with stable employment and no change in number of care users has on average a 0.15 increase in year-on-year unfilled vacancies. Column 3, which controls for establishment fixed effects in addition to our battery of establishment-level characteristics, reports that within establishments a one percentage point increase in the rate of employment contraction is associated with an increase of 1.15 unfilled vacancies. In contrast, a one percentage point increase in the rate of employment expansion is associated with a decrease of 0.85 unfilled vacancies. We believe our findings are fairly robust to the issue of excess zeroes that is common in vacancy data. Intuitively, the logic of our argument rests on observing annual increases in vacancies amongst contracting establishments. To the extent that many establishments report zero change in vacancies, we would expect it to be more difficult to find evidence in favor of our argument. The fact that we have nevertheless found increases in vacancies thus points to the strength in support for our argument in the data.

The estimates of the relationship between employment contraction and change in vacancies are consistent with worsening recruitment difficulties amongst more rapidly contracting establishments. However, the current analysis is not designed to provide conclusive evidence and quantification of the link between employment decline and degree of recruitment frictions. The relationship between employment growth and change in vacancies amongst expanding establishments on the other hand highlights the role of vacancies as a recruitment device. That is, establishments with an increased need for labor report vacancies, which, via the recruitment process, lead to filling open positions.

Finally, we note that for given employment growth, growth in service utilization is positively associated with the change vacancies while a decrease in utilization is not statistically related to a change in vacancies. The positive and statistically significant estimate for growth in service utilization confirms our point regarding the confounding effect of new labor

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TABLE 5 Estimation results—annual change in vacancies.

	(1)	(2)	(3)
Positive employment growth (i.e., expansion)	−0.503**	−0.583**	−0.852**
	(0.238)	(0.250)	(0.401)
Negative employment growth (i.e., contraction)	−1.072***	−0.840***	−1.145***
	(0.271)	(0.300)	(0.384)
Positive utilization growth	1.818***	1.694***	1.411**
	(0.442)	(0.417)	(0.595)
Negative utilization growth	−0.016	0.157	0.166
	(0.415)	(0.428)	(0.612)
CQC (Overall) rating—Inadequate/Req improv.		−0.058	−0.227
		(0.121)	(0.235)
CQC (Overall) rating—No rating		−0.190	−0.102
		(0.266)	(0.348)
Two-year average total employment		0.000	−0.029
		(0.004)	(0.034)
Average total employment—squared		0.000	0.000
		(0.000)	(0.000)
Direct care worker to service user ratio		−0.013***	0.018
		(0.005)	(0.022)
Service users with dementia		0.017	−0.116
		(0.077)	(0.539)
Service users with mental infirmities (ex. MHA)		0.078	2.672***
		(0.079)	(0.901)
Share of workers completed dementia care trg		0.305*	−0.204
		(0.167)	(0.452)
Share of workers completed DRPC trg		−0.241*	−0.245
		(0.144)	(0.245)
Log (mean age of employees)		1.373***	2.847**
		(0.422)	(1.413)
Log (mean experience of employees)		−0.504***	−0.931**
		(0.105)	(0.450)
Log (mean hourly wage of care workers)		0.795	0.670
		(0.611)	(1.978)
Top quartile share of zero-hours contracts in sector		−0.031	0.016
		(0.108)	(0.281)
Unemployment rate at LAD-level		0.073	−0.133
		(0.072)	(0.215)
Log (mean hourly wage) of 1st quartile in LAD		−0.274	−1.126
		(0.981)	(3.942)
Log (mean house price) at PCD-level		0.061	1.986
		(0.160)	(1.338)
Care establishments HHI index at LAD-level		2.891	−47.109
		(3.148)	(38.533)
Constant	0.154***	−6.201*	−31.151
	(0.049)	(3.240)	(20.728)
Year FE	No	Yes	Yes
Care Setting × Year FE	No	Yes	Yes
Sector × Year FE	No	Yes	Yes
Local Area × Year FE	No	Yes	Yes
Establishment FE	No	No	Yes
Observations	10,693	10,693	10,693
R-squared	0.006	0.099	0.360
Adj R-squared	0.06	0.06	−0.136

Robust standard errors clustered by Estab. ID in parentheses, ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

demand. In contrast, because vacancies cannot be used to reduce employment, there is unsurprisingly no link between the change in vacancies and the decreasing service utilization.

Differences across sectors and care settings

To explore how the turnover, hiring and employment growth relationships may differ across sectors and care settings, we repeat the analysis using our preferred specification with establishment fixed for the separate sector and care setting subgroups. Table 6 summarizes the results from this subgroup analysis by reporting the estimates for the coefficients on employment growth and contractions.

Turnover and employment growth

Panel (A) of Table 6 reports the estimates for the regressions with turnover rates as the dependent variable. Comparing Columns 1 and 2, we find that the turnover-employment growth relationship is both qualitatively and quantitatively similar across residential and domiciliary care providers. Domiciliary care establishments with expanding employment tend to exhibit a slightly stronger negative relationship between turnover and employment growth compared to residential care establishments (−0.24 vs. −0.23). In contrast, domiciliary care providers with contracting employment show a slightly weaker relationship between employment decline and turnover relative to residential care (−0.66 vs. −0.73).

Differences across sectors are relatively larger (Columns 3 to 5). Amongst establishments with declining employment, the turnover-growth relationship is strongest amongst public sector care establishments (0.83), followed by voluntary sector (0.71) and then private sector establishments (0.70). Amongst establishments with growing employment, the turnover-growth relationship is strongest in the voluntary sector (0.27) followed by the private sector (0.24) and the public sector (0.15).

To assess if the differences described above are statistically significant, we estimate an extended version of Equation (2) in which the coefficients on positive and negative employment growth (i.e., γ^+, γ^-) are allowed to differ between sectors and care settings on the entire analysis sample. We then perform F-tests on the hypotheses $H_0 : \gamma_k^- = \gamma_l^-$ vs. $H_1 : \gamma_k^- \neq \gamma_l^-$, where k, l index different sectors or care settings and similarly for γ^+. The estimates of the coefficients on employment growth from this auxiliary regression are reported in Columns 1 and 2 of Table A4 but we do not discuss them here, as they are both qualitatively and quantitatively very similar to the results already presented.

Across care settings, the F-tests do not reject the null of identical estimates of γ^+ and γ^- for residential and domiciliary care establishments ($F = 0.01$, p-value $= 0.93$ for $H_0 : \gamma_{res}^+ = \gamma_{dom}^+$ and $F = 0.72$, p-value $= 0.40$ for $H_0 : \gamma_{res}^- = \gamma_{dom}^-$). This implies that the strength of the turnover-employment growth relationship is similar across care settings. Comparing across sectors, we find that amongst establishments with increasing employment, the difference in the turnover-growth relationship is statistically significant between public and private sectors ($F = 5.80$, p-value $= 0.016$) and marginally significant between public and voluntary sectors ($F = 3.41$, p-value $= 0.065$). In contrast the turnover-growth relationship is not statistically different between private and voluntary sectors ($F = 0.04$, p-value 0.84). Amongst establishments with decreasing employment, the difference in the turnover-growth relationship is statistically significant between public and private sectors ($F = 4.36$, p-value $= 0.04$), marginally significant between public and voluntary sectors ($F = 3.72$, p-value $= 0.05$) and not significant between private and voluntary sectors ($F = 0.01$, p-value $= 0.94$).

Hiring and employment growth

Panel (B) of Table 6 reports the estimates for the regressions with hiring rates as the dependent variable. Columns 1 and 2 show that the hiring-employment growth relationship is similar across residential and domiciliary care providers. Residential care establishments with expanding workforces tend to show a slightly stronger positive relationship between hiring and employment growth compared to domiciliary care establishments (0.77 vs. 0.73). In contrast, residential care providers with contracting workforces show a slightly weaker relationship between employment decline and turnover relative to those in domiciliary care (0.27 vs. 0.30).

Columns 3 to 5 report the corresponding cross-sector differences. For expanding establishments, the estimates show that the hiring-growth relationship is strongest amongst public sector establishments (0.85), followed by those in the private (0.75) and voluntary (0.72) sectors. For establishments with declining employment, the hiring-growth relationship is strongest in the voluntary sector (0.29), followed by private (0.26) and then public sector (0.17).

To assess the statistical significance of these differences, we perform the auxiliary regression and statistical tests outlined in the previous section. The estimates, test statistics and p-values from this analysis are reported in Columns 3 and 4 of Table A4. Overall, we find that the hiring-employment growth relationship is not statistically different across care settings ($F = 0.045$, p-value $= 0.832$ for $H_0 : \gamma_{res}^+ = \gamma_{dom}^+$ and $F = 0.025$, p-value $= 0.875$ for $H_0 : \gamma_{res}^- = \gamma_{dom}^-$). Across sectors, the tests indicate that amongst establishments with increasing employment, the difference in hiring-growth relationship is statistically significant between public and private sectors ($F = 5.802$, p-value $= 0.010$) and marginally significant between public and voluntary sectors ($F = 3.591$, p-value $= 0.058$). In contrast, the hiring-growth relationship is not statistically different between private and voluntary sectors ($F = 0.02$, p-value 0.88). For establishments with decreasing employment,

TABLE 6 Estimation results—heterogeneity across sectors and care settings.

	(1)	(2)	(3)	(4)	(5)
	Care setting			Sector	
	Residential	*Domiciliary*	*Public*	*Private*	*Voluntary*
			(A) Turnover rate		
Positive employment growth (i.e., expansion)	−0.227***	−0.244***	−0.149***	−0.239***	−0.273***
	(0.028)	(0.041)	(0.036)	(0.027)	(0.084)
Negative employment growth (i.e., contraction)	−0.730***	−0.657***	−0.828***	−0.705***	−0.708***
	(0.031)	(0.047)	(0.062)	(0.031)	(0.054)
			(B) Hiring rate		
Positive employment growth (i.e., expansion)	0.767***	0.731***	0.851***	0.749***	0.723***
	(0.029)	(0.043)	(0.036)	(0.028)	(0.088)
Negative employment growth (i.e., contraction)	0.265***	0.299***	0.172***	0.264***	0.294***
	(0.033)	(0.055)	(0.062)	(0.037)	(0.055)
Year FE	Yes	Yes	Yes	Yes	Yes
Care Setting × Year FE	–	–	Yes	Yes	Yes
Sector × Year FE	Yes	Yes	–	–	–
Local Area × Year FE	Yes	Yes	Yes	Yes	Yes
Estab FE	Yes	Yes	Yes	Yes	Yes
Observations	7,958	2,751	571	8,289	1,727

Robust standard errors clustered by Estab. ID in parentheses, $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

we find that the difference in hiring-growth relationship is marginally significant between public and voluntary sectors ($F = 3.741$, p-value $= 0.053$) and not significant between public and private sectors ($F = 2.334$, p-value $= 0.127$) and private and voluntary sectors ($F = 0.444$, p-value $= 0.505$).

Interpretation

Based on our arguments regarding the role of staff retention policies, the weaker association between turnover and employment growth in the public sector compared to private and voluntary sectors suggests that workforce expansion in the public sector is less sensitive to establishments' ability to retain workers. To the extent that the relationship between replacement hiring and employment decline reflects recruitment difficulties, the findings also imply that recruitment frictions have a greater impact on employment decline in the voluntary and private sector establishments compared to public sector establishments.

Robustness of findings

In this section we explore robustness of our findings with respect to the on distribution of establishment sizes, functional form assumptions on the relationship between employment growth and worker flows and weighting to account for sample representativeness.

To explore how our findings may be affected when accounting for representativeness of the aggregate LTC sector, Table A3 reports results from repeating the fixed effects regression analyses reported in Tables 3–5 with our calibrated sampling weights. The idea behind weighting is to correct for under/over-representation in our sample along the dimensions used for calibration (details in the Note in Table A2). Comparing the weighted against unweighted estimates shows minor differences in the key estimates of interest. Given their similarity, our main analysis has opted for the more parsimonious approach of focusing on the unweighted analysis data.

To understand if our findings are sensitive to the distribution of establishment sizes in our data, Table A4 reports results from repeating the fixed effects regression analysis for subsamples split by establishment size. Panel (A) shows that the turnover-employment growth relationship is largely similar across establishment sizes. Similarly, Panel (B) shows that the estimates for the coefficients on employment growth in the hiring-employment growth regressions are largely similar across establishment size groups. This assures us that our results are not driven by the distribution of establishment sizes in our sample.

We next assess our assumptions on the functional form of $\gamma(g)$, the relationship between employment growth and turnover/hiring. The top panel of Column 1 in Table A5 reproduces the estimates from Table 3 Column 3, displaying only the employment growth coefficients. The second panel reports the test statistic and p-value for a test of $H_0 : \gamma^+ = \gamma^-$. These reject the null of identical coefficients (p-value $= 0.00$) and

indicate that a piece-wise functional form allowing for different turnover-growth relationships amongst contracting vs. growing establishments is consistent with the data. Similarly, Column 4 of Table A5 reproduces the estimates from Table 4 Column 3 and reports the test statistic and p-value for a test of difference in the coefficients on positive and negative employment growth. These reject the null of identical coefficients (p-value = 0.00) in support of allowing for different hiring-growth relationships amongst contracting vs. growing establishments.

The above tests for the appropriateness of the piece-wise specification (with a knot at zero growth) maintained the assumption of linearity outside of the knot. We next examine possible non-linearity in the turnover-employment growth and hiring-employment growth relationships while maintaining the assumption of a piece-wise form. We require the latter because the marginal effect of a change in employment growth rate on turnover/hiring rates for non-linear specifications depends on the reference employment growth value. As such, we cannot apply the direct test of a difference between marginal effects of positive vs. negative growth coefficients, as we did above.

Columns 2 and 3 of Table A5 report estimates of the coefficients on employment growth, allowing for separate quadratic (Column 2) and cubic (Column 3) functional forms for growing and contracting establishments. The coefficient estimates are all statistically significant at the one-percent level in Column 2 but are not significant at the 10-percent level for quadratic and cubic terms in Column 3. The statistically significant estimates for the quadratic specification in Column 2 indicate some curvature in the turnover-employment growth relationship. These estimates imply average marginal effects of employment growth on turnover equal to −0.289 for expanding establishments and −0.651 for contracting establishments. As these are close to the corresponding estimates of −0.231 (expanding establishments) and −0.713 (contracting establishments) for the linear specification, we believe the results from our preferred specification are reasonably robust to abstracting from this curvature in the turnover-employment growth relationship.

Similarly, Columns 5 and 6 of Table A5 report estimates from quadratic (Column 5) and cubic (Column 6) functional forms for the relationship between hiring and employment growth. The coefficient estimates in the quadratic specification are all statistically significant at the one-percent level, while all but one of the estimates for the coefficients on squared and cubed terms in Column 6 are statistically insignificant. Focussing on the quadratic form in Column 5, the estimates imply average marginal effects of employment growth on hiring equal to 0.687 for expanding establishments and 0.354 for contracting establishments. In comparison, the corresponding estimates from the piece-wise linear specification are 0.760 for expanding establishments and 0.263 for contracting establishments. As with the model for turnover, we believe that the benefit of having clear interpretations of the key coefficients on employment growth outweighs the relatively small bias from misspecification in the context of the present study.

Discussion

In this study, we used a framework for analyzing the relationship between employment growth and worker flows and applied it to the context of care workers in the LTC sector in England. Using our estimates of the direction and magnitudes of these relationships, we shed light on the roles of staff retention and recruitment difficulties in the employment growth dynamics of LTC establishments.

Our finding that, amongst expanding establishments, turnover is decreasing with the rate of employment growth, and hiring rates are increasing but at a rate less than one-for-one differs from earlier studies (27, 28). It implies that unlike these cases, employment growth in our context is not driven solely by establishments' rate of hiring but also by their ability to control the outflow of existing workers. Put differently, this result highlights that staff retention policy is not only crucial for maintaining establishments' current workforce but is also important for achieving sustained workforce expansion. With respect to existing literature on turnover and retention in LTC, this finding introduces additional motivation, beyond care quality concerns, for improving retention amongst care staff.

To understand why the rate of replacement hiring is decreasing amongst contracting establishments, we made novel use of data on changes in vacancies. While standard "frictionless" models of labor markets would suggest that the observed slowdown in replacement hiring reflects intentional downsizing, our analysis found concurrent increases in unfilled vacancies which contradict this hypothesis. These findings instead suggest that difficulties in recruitment are important for explaining the pattern of decreasing hiring amongst contracting care establishments. While such recruitment difficulties have been suggested in workforce reports (1), the present study provides quantitative evidence of their presence and impact in the LTC sector.

Beyond employment growth, we find that unobserved establishment-level heterogeneity accounts for a large part of the cross-sectional variation in turnover and hiring rates. Nonetheless, our results confirm findings from previous studies that managers' turnover is positively related to care workers' turnover rate (5, 15, 21). In this respect, our analysis contributes to this discussion by highlighting that managerial staff turnover is related to care worker turnover both directly and indirectly, through the mediation of intangible organizational characteristics (i.e., culture). Moreover, our results show that

the latter appears to account for a larger part of the association between managerial staff stability and care worker turnover.

While outside the scope of the present study, our analysis has uncovered a high level of staff churn, defined as the hiring and separations in excess of the levels required to achieve a given level of employment change, in the LTC labor market. Although not directly comparable, the average annual churn rate of about 81.8 per cent in our data is remarkably high compared to the average quarterly churn rate of about 22.8 per cent in the non-manufacturing sector in the U.S. (31). The literature on staff churn has interpreted churning as reflecting re-evaluation by workers and employers of the match between the worker and their job position. Based on this interpretation, care workers' employment conditions (e.g., low pay, lack of progression, competition for labor within the care sector and from outside the sector) and the nature of their work (significant amount of learning on the job, cognitively and emotionally challenging) are both likely contributors to the high rate of churn we observe.

Policy implications

Our analysis suggests that policies that enable better staff retention and improve recruitment of new hires would aid in maintaining and growing the LTC workforce. Some measures, such as improving the terms of employment and increasing the possibility of career progression, are likely to aid in both of these aspects since these measures benefit existing employees and increase the attractiveness of care worker positions. The fact that we found turnover to be negatively related to employment growth also calls into question how best to expand the current LTC workforce to meet increasing demand. One approach is to increase hiring rates by "casting a wide net," for example by relaxing selection criteria. However, this strategy may be counterproductive to the extent that it leads to hires with poorer job fit and subsequently higher rates of staff turnover. Alternatively, employers may consider longer-term job fit as an important criterion in recruitment. One example of such a strategy that has been used in practice is values-based recruitment (32). While this approach is likely to result in a slower rate of hiring, its long-term payoff is to reduce subsequent turnover, thus resulting in more sustainable employment expansion. Ultimately, the best approach depends on the extent and urgency of staffing shortfalls and is likely to differ between establishments.

Limitations and future work

Throughout, we were careful to note that estimated relationships are associations and do not have causal interpretation. In general, hiring, separations and growth are likely to be linked through complex processes both within an organization and in the wider labor market. To examine these processes and establish causal links would require thorough structural equation modeling or exploit exogenous changes in labor market conditions, such as changes to the National Living Wage (the U.K. minimum wage). Also, our analysis excludes newly formed establishments due to the need to measure annual changes in employment. Nonetheless, this group may have different hiring and turnover dynamics and face different challenges compared to incumbent establishments. Understanding the relationship between turnover, hiring and employment growth for new care establishments is hence another potentially interesting area for future work.

As noted in our discussion, our analysis has also found high staff churn rates in the LTC sector (31). This suggests that there is a large amount of inefficient inflow and outflow of workers from LTC establishments and points to an urgent need to understand the source of such inefficiencies and the impact they may have on care provision. Relatedly, our study also highlights gaps in our current knowledge on the recruitment practices of LTC providers and the implications of these practices on staffing and quality of care. These are pertinent issues which similarly warrant further exploration.

Data availability statement

The data analyzed in this study is subject to the following licenses/restrictions: The dataset is available from Skills for Care subject to a Data Sharing Agreement. Requests to access these datasets should be directed to analysis@skillsforcare.org.uk.

Author contributions

HT contributed to the study conception, led the empirical analysis, and drafted the manuscript. FV contributed to the conception of the study, the empirical analysis, and the drafting of the manuscript. E-CS prepared the dataset, was involved in the early stages of the empirical analysis, and provided feedback on the manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2022.969098/full#supplementary-material

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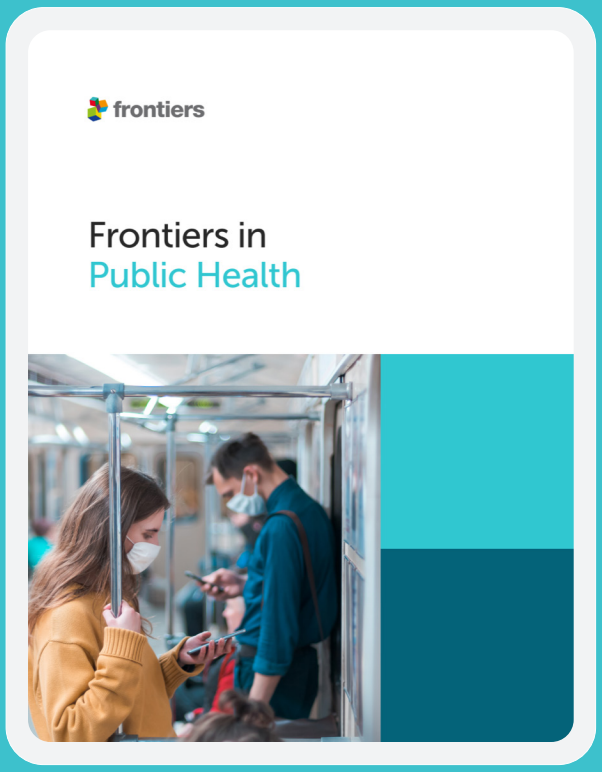

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