

Explore the Impact of AIGC Companionship Tools on Older People Living Alone

Bei Wang^{1,a}, *Jing Yang^{2,b}

{^a24551228@qq.com, ^b1460772802@qq.com}

¹Shanghai Urban Construction Vocational College, Shanghai, 201415, China

²Shanghai Jian Qiao University, Shanghai, 201306, China

Abstract. In the context of the continuous increase in the number of elderly people living alone in the world, the loneliness and isolation of elderly people living alone have increasingly generated widespread and serious social problems. This article aims to explore whether AIGC can fill or partially fill the psychological gap of elderly people living alone in the future, improve their mental health and quality of life, and explore possible problems and risks.

Keywords: AIGC(Artificial Intelligence Generated Content),Elderly people,Living alone

1 Introduction

The world population is aging rapidly. According to the World Health Organization, there are currently 1 billion people aged 60 and above in the world, and this number will rise to 1.4 billion by 2030, accounting for one-sixth of the global population. By 2050, the number of people aged 60 and above will double from 2020, reaching 2.1 billion. Between 2020 and 2050, it is expected that the number of people over 80 years old will triple, reaching 426 million, of which about 14% of adults aged 60 and over have mental disorders. According to the 2019 Global Health Estimates, these diseases account for 10.6% of the total disability (disability-adjusted life years) of the elderly. The most common mental health problems among the elderly are depression and anxiety. The 2019 Global Health Estimates showed that globally, about one-quarter (27.2%) of suicide deaths occurred in people aged 60 or older.

According to the data of the seventh national census, there are 264 million elderly people in China. Recent surveys have shown that the proportion of empty-nest elderly (elderly couples) and elderly living alone in the elderly population has exceeded 50%. In recent years, the number of elderly living alone has further increased.

Some studies suggest that among all the factors that affect the loneliness of the elderly[1], the marital status of having or not having a spouse is the most important factor affecting the loneliness of the elderly. Generally speaking, widowed elderly are more likely to feel lonely than married elderly. The more neighbors and friends there are, the lower the degree of loneliness. The more children there are, the higher the degree of loneliness. The larger the family size, the lower the degree of loneliness of the elderly[2],[3]. The loneliness of widowed, divorced and unmarried elderly is significantly higher than that of remarried people. At the same time, "single and living alone" is a group with a high rate of loneliness.

Therefore, the continuous increase in the number of elderly living alone is a long-term social development trend. Against this backdrop, reducing the loneliness of elderly living alone is an important measure to prevent mental illnesses such as depression and violent events such as suicide.

2 The Explain the unmet psychological needs of elderly people living alone from the perspective of Maslow's hierarchy of needs theory

The need hierarchy theory is an important cornerstone of Maslow's humanistic theory (according to Fig.1), in which the needs for belonging, love, and respect at level three are the focus of the hierarchy of needs theory. Maslow believed that individuals "desire to be recognized by a certain society and group, and to establish good and harmonious interpersonal relationships with colleagues. If a person cannot be accepted and recognized by the organization, his self-awareness will produce a clear sense of division. That is to say, after meeting physiological and safety needs, individuals prefer to engage in social activities or interact with others. Individuals expect to receive high attention in the group, that is, they hope to receive recognition for their abilities or achievements from others, or high praise from others.

In actual elderly life, a sense of belonging to a group can be obtained through group activities, but this aspect is limited by personal characteristics, hobbies, and physical conditions, and it is difficult to obtain a sense of belonging to a closer relationship.



Fig.1. Maslow's hierarchy of needs theory.

At the same time, this level of needs involves the promotion of personal value and social status. People hope to achieve success in their work and social environments, and to gain recognition and respect from others. This also includes respect for themselves and a sense of self-worth. However, due to the gradual weakening of social value and the limited opportunities for participation in social production, it is difficult for the elderly to gain a sense of value, and thus it is difficult for them to gain recognition and respect.

Therefore, for the elderly, especially the elderly living alone, although with the progress of society, physiological and safety needs can be more satisfied, the sense of belonging and being

loved in the spiritual level, which can only be provided by intimate relationships and family, is often difficult to be satisfied. From this perspective, it is analyzed that the elderly living alone lack the sense of satisfaction in the third level of needs, which is the root of loneliness and pain of the elderly. Therefore, from this perspective, how to better meet the spiritual needs of the elderly, improve their quality of life, reduce the risk of loneliness and other psychological diseases.

3 The development status and trend of AIGC

3.1 New features of GPT-4 Turbo released by Open AI in November 2023

GPT-4 Turbo introduces more contextual understanding capabilities. This means it can better understand the context of the conversation, respond better to user questions, and provide more in-depth answers. This is of great significance for application areas such as chatbots, virtual assistants, and customer support systems.

GPT-4 Turbo is more focused on ethics and security. It is designed to prevent improper use, strengthen content filtering and risk management, and reduce the spread of false information and harmful content.

The new version adds new multimodal features, including vision, image creation (DALL·E 3) and text-to-speech (TTS). Turbo version GPT-4 can accept images as input in the Chat Completions API, enabling use cases such as generating captions, detailed analysis of real-world images, and reading documents with graphics.

Supporting customized model services(Fig.2.), as shown in the figure below, can form a personalized and AIGC assistant



Fig.2.GPT4 Turbo customized model services.

3.2 Analysis of the development trend of generative artificial intelligence

According to the speech delivered by Ilya Sutskever, the chief scientist of OPEN AI, in 2018, in his definition, AIGC is a developing digital brain. At present, the ability of this digital brain is not as good as that of the human brain, but in the future development, the digital brain will surpass the ability of the human brain and can replace professionals to work and surpass their professional level. For example, it can become your exclusive doctor, lawyer, teacher.

AIGC has the following trends:

1. As a digital brain, AIGC will eventually surpass the logical thinking ability of the human brain;
2. Artificial intelligence will gradually have "consciousness", and can have its own opinions, compassion, emotions, and other abilities;
3. Everyone can customize their own AI to make it their own exclusive professional service provider, such as a psychiatrist, assistant, etc;

Based on the development trend of AIGC, we can expect that it will provide "human-like" services for the elderly in the future.

4 The help and risks of AIGC in enhancing the third level of Maslow's hierarchy of needs for elderly people living alone

4.1 The help of AIGC in enhancing the third level of Maslow's hierarchy of needs for elderly people living alone

AIGC can reduce the loneliness of the elderly through "human-like" services, helping them overcome psychological difficulties, such as forming exclusive chat partners, psychologists, exclusive knowledge teachers, science, health care[6], foreign languages, exclusive playmates, such as video games. In the past, these tasks could only be completed by humans, but in the future, AIGC will gradually replace these tasks.

With the development of AIGC, he will gradually become more human-like, with certain emotional abilities, empathy, and compassion, coupled with unparalleled knowledge and abilities, and will become a "personal partner" for elderly people living alone.

At the same time, AIGC can be combined with health detection technology[4],[5], such as through wearable devices, to monitor their health status in real time, such as heart rate, blood pressure, blood sugar, etc. These data can be analyzed by AIGC, providing more personalized health advice for the elderly. In addition, AIGC can also help the elderly make appointments with doctors, purchase drugs, etc., improving their health level.

Many elderly people still hope to contribute to society after retirement by using their own value. AIGC can provide more learning and development opportunities for the elderly. For example, online education platforms can enable the elderly to learn new knowledge and skills, improving their overall quality. At the same time, AIGC can also help the elderly to pass on their experience and knowledge to young people, realizing intergenerational inheritance.

4.2 Risk analysis of AIGC in the application of elderly care services

Analysis of laws and regulations and other risks in the application of AIGC in pension

1. The legal status of AIGC is unclear

The legal status of AIGC is still unclear. Although AI technology has developed rapidly in recent years, relevant laws and regulations have lagged behind. Currently, there are certain legal gaps in the definition, ownership of rights, and responsibility of AI. Therefore, when using AIGC as a companion tool, it is necessary to clarify its legal status first to ensure compliance with laws and regulations.

2. Privacy Protection

Privacy protection is another important legal issue facing AIGC. During the companionship process, elderly people will provide a large amount of personal information to robots, such as health status, family situation, and living habits. These information involve the privacy rights of elderly people and need to be protected. Therefore, when developing and using AIGC companionship tools, it is necessary to strictly abide by relevant laws and regulations to protect the privacy rights of elderly people.

3. Spreading of illegal information

AIGC chat may be used to spread illegal information, such as pornography, violence, terrorism, etc. If the platform does not take effective content review and management measures, these illegal information may cause harm to users or harm to society.

4. Mislead users

Since the algorithms and models for AIGC chat are designed and controlled by developers, if there are defects or biases in their algorithms or models, they may mislead users, giving them incorrect advice or decisions, which can result in losses or risks for the users.

5. Ethical issues

There are significant differences between current AIGC and humans. They currently lack human emotions and consciousness. Although they can imitate human language and behavior patterns, they do not have true emotional experiences and subjective consciousness. When AIGC has a certain degree of "self-awareness", how to define it as a machine or a living being from an ethical perspective.

6. Take responsibility

When AIGC exhibits improper behavior or causes losses, how to bear responsibility is also a concern. As AI does not have the qualifications of a legal subject, it cannot bear corresponding legal responsibility. Therefore, when designing and using AIGC companionship tools, it is necessary to clarify the subject of responsibility and the scope of responsibility, so as to ensure the protection of the rights and interests of the elderly.

5 The tool design for exploring AIGC for reducing loneliness in elderly people living alone

In order to determine whether future AIGC will help improve the happiness of elderly people living alone. Refer to Figure 3, this article conducted a survey tool design.

5.1 System design block diagram for survey tool

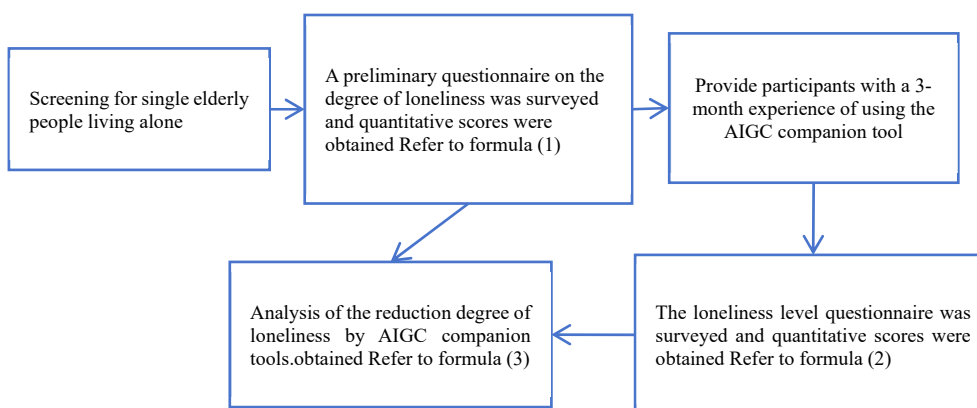


Fig.3. System design block diagram.

5.2 Participants select Introduction

Respondents are screened in different ways, such as by age, gender, health status, and other factors. It should be noted that the sampling should reflect the overall situation of the research subjects as much as possible, and two types of elderly people living alone can be selected and surveyed according to the number of sample > 1000.

1. Community nursing homes: select single elderly people over 60 years old who have a certain ability to take care of themselves.
2. Home bound elderly: Recruit elderly people living alone in the city through communities, volunteer organizations and other channels.

5.3 Algorithmic model selection for survey tools for loneliness Degree

Refer to Table 1, The commonly used survey tools are as follows.

Table 1. Mainstream loneliness survey algorithm models.

Algorithmic Model	Basic introduction
GRS	Golombok-Rust Scale of Loneliness, This is a widely used autism scale that includes 11 items and is used to assess the degree of loneliness in older adults.
ULS	UCLA Loneliness Scale, This is a concise loneliness scale consisting of three items that is used to assess the degree of loneliness in the older population

SER	Senior Evaluation of Relationships, This scale is mainly used to assess the social relationships and contentment of older adults, and thus their loneliness.
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The GRS Loneliness Questionnaire is a widely used loneliness scale consisting of 11 items. We use GRS as the model of this survey. Here are examples of the first three topics:

Guiding Words: Here are some statements about how you've felt over the past two weeks. Please tick the number (1-5) at the end of each item according to your actual situation.

Example: (Questionnaire questions 1-3)

1. I often feel lonely.
1 - Strongly Oppose 2 - Oppose 3 - Neutral 4 - Agree 5 - Strongly agree
2. I feel like people don't really know me.
1 - Strongly Oppose 2 - Oppose 3 - Neutral 4 - Agree 5 - Strongly agree
3. I often can't find someone to help me when I need it.
1 - Strongly Oppose 2 - Oppose 3 - Neutral 4 - Agree 5 - Strongly agree

5.4 Analyze the results of the questionnaire

After the questionnaire data were collected, statistical analysis methods could be used to evaluate the degree of loneliness reduction and other analysis results of the elderly. Based on factor_improvement, we can determine whether AIGC companion tools can reduce loneliness and enhance happiness in elderly people living alone.

$$GRS_{mean-before} = \sum_{i=1}^{i=NUM} GRS_{before}(i) \quad (1)$$

$$GRS_{mean-after} = \sum_{i=1}^{i=NUM} GRS_{after}(i) \quad (2)$$

Loneliness improvement results:

$$factor_{improvement} = \frac{GRS_{mean-after} - GRS_{mean-before}}{GRS_{mean-before}} 100\% \quad (3)$$

6 Conclusion

In short, AIGC as a companion tool has broad application prospects, but there are still some legal issues that need attention and resolution in practical applications. Only by improving laws and regulations, strengthening privacy protection, clarifying responsibility and strengthening supervision, and addressing ethical issues can we ensure the legal and compliant use of AIGC companion tools, providing better psychological support and social interaction services for the elderly.

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