







PILOT STUDY **OPEN ACCESS**

# Effectiveness of Peer Mentoring for the Prevention of Dependency: A Pilot Study in a Rural Setting

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**Received:** 3 August 2024 | **Revised:** 6 September 2024 | **Accepted:** 11 October 2024

**Funding:** This research was funded by Government of the Principality of Asturias (Consejería de Derechos Sociales y Bienestar Principality of Asturias). Project 'INYPEMA Living Lab'; Recovery, Transformation and Resilience Plan (Government of Spain); Next-Generation EU.

**Keywords:** active ageing | health education | information and communications technology | mental health | peer mentoring | physical health | social support

## ABSTRACT

**Aim:** To analyse the effectiveness of an active ageing intervention modality through peer mentoring.

**Design:** A quasi-experimental research study is carried out through three groups, one control (educational workshops on active ageing given by professionals) and two experimental (workshops given by peers with digital or face-to-face exposure).

**Methods:** All groups share duration (7 weeks) and content, modifying the route of exposure. The effectiveness of the model is measured through the variables of physical health, mental health and social support. Loneliness and the need for care are also controlled for.

**Results:** The total sample consists of  $n = 209$  people aged over 60 living in a rural context, of which  $n = 12$  form the volunteer/mentor group. Active ageing interventions show an improvement in the perception of physical and mental health among people in need of some form of care, with all three modalities being equally effective. The impact on social support is analysed by controlling for the loneliness and social participation variable; in these cases, the face-to-face experimental group of peers is more effective than the others.

**Conclusions:** The peer-to-peer methodology is as effective as the traditional methodology with a practitioner in maintaining and improving health perception, and the face-to-face methodology with peers is more useful in fostering social support among people experiencing loneliness.

**Implications for the Profession and/or Patient Care:** Peer mentoring is presented as a good strategy to improve social support for older people and to combat loneliness.

**Impact:** To address the prevention of dependency through the promotion of active ageing. Peer mentoring is confirmed to have a significant impact on social support and could be a socio-educational tool applicable to older people experiencing loneliness.

**Reporting Method:** This study has adhered to JBI guidelines. JBI critical appraisal checklist for quasi-experimental studies has been used.

**Patient or Public Contribution:** Volunteer mentors contributed to the design and delivery of the workshops.

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## Summary

- What does this paper contribute to the wider global clinical community?
  - It proposes effective educational intervention modalities to promote active ageing.
  - Providing empirical evidence on the effectiveness of peer mentoring.

## 1 | Introduction

The 69th World Health Assembly, convened by the WHO in 2016, declared the years 2021–2030 as the Decade of Healthy Ageing. It is a project that aims to bring together the efforts of governments, civil society, international bodies, professionals, academic institutions, the media and the private sector with the aim of improving the lives of older people (World Health Assembly 2016).

By the end of the decade in 2030, the number of people aged 60 and over is projected to increase by 34%, from 1 billion in 2019 to 1.4 billion worldwide. By 2050, the world's population of older people will reach 2.1 billion, with more than twice as many people over the age of 60 as children under the age of 5, also outnumbering adolescents and young adults (World Health Organization 2020).

Many older people lead healthy lives and are able to live active lives contributing to their communities and society as a whole through voluntary work, formal employment or helping their families. However, dependency increases with age and is particularly prevalent among the very old. With increasing numbers of older people, the demand for long-term care will rise, which is why global social policies have among their priority objectives the promotion of active and healthy ageing that prolongs the independence of older people (World Health Assembly 2016).

The WHO states that 'Healthy ageing is the process of developing and maintaining the functional ability that enables well-being in older age. Functional capacity is determined by a person's intrinsic capacity (i.e. the combination of all his or her physical and mental capacities), by the environment in which he or she lives (understood in its broadest sense and including the physical, social and political environment) and by the interactions between the two' (World Health Organization 2020, 3). It considers six determinants of active ageing, which in turn encompass various aspects:

- Health and social services, including health promotion, curative services, long-term care and mental health services.
- *Behavioural*: smoking, physical activity, healthy eating, alcohol, medication and adherence to treatment.
- *Personal factors*: psychological, genetic and biological.
- *Physical environment*: safety at home, falls and absence of contamination.
- *Social environment*: social support, violence and abuse, education and literacy.

- *Financial*: income, social protection and work.

Measures and actions should be developed on these factors with the aim of promoting a positive way of ageing. Moreover, these factors must be taken into account both from an individual dimension (responsibility for self-care) and from the design of comprehensive policies (World Health Organization 2002).

## 2 | Background

Within the different measures that promote active ageing, interventions that develop social participation have a direct impact on different dimensions of quality of life such as physical and mental health (Marzo et al. 2023). Social support has been identified as a determining factor in the promotion of a person's well-being and, therefore, their health. There is ample scientific evidence that a satisfactory social network benefits both physical and mental health and influences the well-being and quality of life of older people, promoting healthy behaviours and habits (Birditt and Newton 2016).

One of the phenomena that socially affects older people is that of unwanted loneliness (Ibáñez-Del Valle et al. 2022). Although its presence has been evidenced in different social groups—and within their age group, its affectation has recently become evident in the young population (Fardghassemi and Joffe 2021)—it is a problem associated with and studied in older people. This is due to factors such as the decrease in significant affective relationships, the changes in roles associated with retirement, the decrease in financial income or the deterioration of health (Courtin and Knapp 2017).

Older people living in rural areas often face more severe social isolation (Hussain et al. 2023). The geographical dispersion that characterises rural areas means that inhabitants are often isolated, with great difficulty in socialising and accessing services. In addition, these rural regions have seen a migration of the younger population towards the cities, which has further increased the ageing index in these areas (World Health Organization 2015). The combination of all these factors means that people living in rural areas face a number of specific needs that are generally not met, putting them at a disadvantage compared to older adults living in cities. Furthermore, many of the resources and services aimed at the older population are based on urban models and need to adapt to the characteristics of the rural population, bringing services closer to reduce the geographical gap (Skinner and Winterton 2018).

One of the aspects that an appropriate social environment should include is the creation of lifelong learning opportunities for older people as a way of staying active, establishing meaningful social relationships and continuing to participate in society to the extent of their possibilities and wishes (Formosa 2019). Lifelong learning would involve the implementation of age-appropriate training models, strengthening the digital skills of older people so that they can benefit from online education, and improving connectivity and accessibility of services in rural and remote areas to address the depopulation of these regions and the social and digital

exclusion of the older population living there (World Health Organization 2020).

Lifelong learning is an essential element of active ageing (World Health Organization 2002). Cuenca (2011) analysed the learning motivation of older people through a study of students enrolled in a University Programme for Older Adults. She states that the main element to achieve effective learning in older people is motivation, both intrinsic and extrinsic; therefore, learning must meet several objectives beyond academic performance or results: to promote the autonomy of older people, develop sociability, enhance the feeling of usefulness and prepare older people for a new future, improve self-esteem and consequently the quality of life. These objectives are not always achieved in formal learning, so it is important not to overwhelm older people with excessive theoretical content that is not related to their reality. The knowledge they acquire should be useful for their life, themselves and their social and family environment (Formosa 2019).

Among the methodologies suitable for the older population is cooperative learning. This is an inclusive educational methodology that is based on the collective construction of knowledge and converts heterogeneity into a positive element of learning; participants become active agents in it, leading to more lasting and significant learning (Johnson and Johnson 1999). The group is considered as the driving force of learning, which is conceived as a social activity. The learning process is a joint goal of the group; the most knowledgeable participants offer help to the rest, and therefore psychosocial skills are promoted through mutual help, respect and solidarity. In addition, other skills such as acceptance of different points of view, communication and negotiation are fostered (Wolfe et al. 2023).

Among the different cooperative learning methods, peer tutoring or mentoring is a system of tutoring with an asymmetrical relationship, in which students with different levels of knowledge share the common objective of developing curricular competences (Sundli 2007). The closeness that exists between mentor and mentee, not only by age but also by circumstances (same concerns, same social situation, etc.) creates a climate of trust and companionship that favours the acquisition of knowledge and meaningful learning. This environment gives the student greater confidence in their skills, reducing the stress and anxiety generated by formal educational environments (Colvin and Ashman 2010).

This methodology has been used more in the sphere of university education (Alonso et al. 2024), but there are also experiences in the context of older people. Cuenca-Amigo, García-Feijoo, and Eizaguirre (2016) analysed the advantages of the participation of older people as mentors in training projects, taking advantage of the experience of people who are no longer part of the active population, but who have accumulated years of wisdom that they can put at the service of organisations. Retirement is presented as a possibility of time available that nowadays, due to the way in which people age, with more personal capabilities and health, allows them to participate actively in all kinds of activities (World Health Organization 2015). In this way, the leisure experience that takes place in this process is social and educational: social because of the relationships that are established

between mentors and mentees and educational because there is a learning process for both parties (Korpela, Pajula, and Hänninen 2023).

## 2.1 | Active Ageing and New Technologies

The marked ageing of the world's population and the rapid development of Information and Communication Technologies (ICTs) has put the focus on the digital inclusion of older age groups as one of the challenges of contemporary societies. The active participation of older people in technological environments plays a key role in improving quality of life and healthy ageing (World Health Organization 2020). New technologies promote autonomy and creativity, create social networks to avoid isolation and loneliness, and enable access to different services (World Health Organization 2015).

When addressing the issue of ICTs and older people, all authors agree on the recognition of a situation of disadvantage, with older adults being considered as 'digitally excluded' or 'late adopters' compared to the younger population of digital natives (Casamayou and González 2017). ICTs are an opportunity for older people to remain integrated in society, but for their adoption to take place, programmes and initiatives are needed to help older people to make them their own, to incorporate them into their daily lives (World Health Organization 2020). Digital inclusion policies should address two dimensions: instrumental competences, related to usage skills and the attribution of meaning that involves using technologies to construct meanings in relation to their lives, interests and projects (Casamayou and González 2017).

The use of ICTs in the design of educational tools includes various methodologies including microlearning. The term microlearning refers to a flexible approach to learning that involves brief, focused content, accessible anytime and anywhere, and is often associated with digital and mobile technologies (Torgerson 2021). Among the materials used are Twitter messages (currently X) or short images, educational videos, infographics or online courses.

There are different theories on how people learn; cognitive load theory maintains that knowledge is stored in long-term memory in the form of schemas that constitute a system for organising and storing information (Sweller 1988). Microlearning, due to its design features, favours the synthesis of the most relevant content (thus avoiding redundant information), which allows learners to invest more cognitive resources to build schemas and achieve better learning outcomes (Meng, Wang, and Li 2016). The core of microlearning resources is that the teacher transmits knowledge, but students are the main and active part of the cognitive process. Therefore, microlearning resources reflect a student-centred concept of teaching, which allows them to experience learning in an active way, developing their autonomy (Torgerson 2021). Moreover, by using new technologies such as social networks, it also allows interaction between students and fosters their sense of relationship. All this raises the levels of perceived autonomy, competence and relatedness, improving intrinsic motivation and learning performance (Nikou and Economides 2018).

### 3 | This Study

Therefore, the aim of this study is to analyse the effectiveness of a technologically supported microlearning intervention model designed through peer mentoring, aimed at the prevention of dependency and the psychosocial well-being of the older population in a rural context.

Preventing dependency will be done by promoting active ageing, and working from the approach that the World Health Organization (2002) puts forward, especially when referring to the term 'active', which it defines as 'continued participation in social, economic, cultural, spiritual and civic affairs, not just the ability to be physically active or to participate in the labour force' (World Health Organization 2002, 79).

Similarly, effectiveness will be studied in terms of the impact on three variables: mental health, physical health and social support, in order to approach a bio-psycho-social view, and controlling for aspects related to the conditions of loneliness and the need for care of the sample reached.

## 4 | Methods

### 4.1 | Design

In order to respond to the objective of this work, a quasi-experimental research design was carried out with pre- and post-measures through three groups, one control and two experimental groups:

- Control: face-to-face group with a professional (FGProf): face-to-face workshops for older people with content on active ageing facilitated by a professional.
- Experimental: face-to-face group with peers (FGPeer): face-to-face workshops for older people with content on active ageing, facilitated by a peer.
- Experimental: Digital group (DG): delivery of active ageing content through dissemination using a mobile social network and telephone follow-up facilitated by a peer.

All groups share the same duration (7 weeks) and content used in the delivery of the active ageing workshops, with a change in the route of exposure.

Peer mentoring, the tested methodology, presents a socio-educational approach to the promotion of active ageing. It aims to facilitate a peer-to-peer knowledge transfer process, using microlearning audio-visual resources on active ageing co-produced by the older people themselves, together with the fact that the older people are the ones who transmit this knowledge to other recipients, either through a face-to-face modality (FGPeer) or a remote modality (DG). In both cases, they are supported by a reference professional, but it is the elderly volunteer who facilitates the workshops. In the control group (FGProf), the exposure to the content is traditional, facilitated by a reference professional.

### 4.2 | Sampling

The total sample consists of 209 people. Two convenience sampling processes were carried out, the first being dedicated to the search for people who would play the role of volunteers or facilitators of the peer mentoring methodology, and the second to people who would receive the workshops. This second group was referred to as the participants.

The group of volunteers was formed on the basis of an open call that was disseminated in various places where older people were present. Information was sent by e-mail, telephone calls as well as posters to the addresses of different associations for older people and social centres in the region. The final sample obtained was  $n = 12$ .

As for the group of participants, the selection criteria for participation in the project were limited to people over 60 years of age, living in a rural context in the Spanish region of Asturias. In addition, people should not be experiencing a diagnosed dementia process, or any other highly incapacitating situation. A total of 25 groups were formed with an initial sample of 197 subjects, of whom 185 completed the process. These were distributed randomly as follows: 9 FGProf ( $n = 59$ ), 9 FGPeer ( $n = 75$ ), 7 DG ( $n = 51$ ). The socio-demographic characteristics of the subjects are shown in Table 1.

### 4.3 | Procedure

The older volunteers who act as mentors in the designed methodology have been previously trained in active ageing issues, and have designed, together with professionals, the materials to be used in the workshops. These materials are short videos (focused on microlearning) and infographics. The design of the workshops and the topics to be covered, along the lines of other initiatives such as that of Sancho Castiello et al. (2007), have also been defined in a participatory manner by this group of volunteers (Table 2).

After the training and preparatory phase, the intervention began under the three modalities presented in the design.

In the face-to-face groups, an initial presentation session was held in which the pre-test was also applied. Subsequently, each week, in the case of the face-to-face interventions, the workshops were held and ended with a final closing session and application of the post-test. The procedure was the same in the FGProf and FGPeer groups; in the first case, the workshop was facilitated by a professional intervention technician and in the second by an older volunteer with the support of a professional technician.

In the case of the digital group, an initial face-to-face session was held with similar characteristics to the one carried out in the face-to-face groups, consisting of a presentation of both the professionals (intervention technicians) and the peers (older volunteers of the methodology) and the rest of the participants. Likewise, information was given on how the work dynamics would be in the following weeks and the pre-test was completed.

**TABLE 1** | Socio-demographic characteristics of the sample.

Variable	Level	Frequency	Percentage	
Sex	Female	159	80.71%	
	Male	26	13.20%	
Marital status	Unmarried without partner	13	6.60%	
	Unmarried with partner	5	2.54%	
	Married	96	48.73%	
	Widowed	56	28.43%	
	Separated	3	1.52%	
	Divorced	12	6.09%	
Education	Basic	136	69.04%	
	Mid-level	30	15.23%	
	Higher	19	9.64%	
Who they live with	Alone	56	28.43%	
	Alone with partner	81	41.12%	
	Partner and children	14	7.11%	
	Without a partner and with children	17	8.63%	
	Other family members	10	5.08%	
	In a care home	1	0.51%	
	Other situations	6	3.05%	
	Needs care	Yes, continuously	5	2.54%
		Yes, a few hours a day	5	2.54%
Yes, a few hours a week		12	6.09%	
No		163	82.74%	

Subsequently, a total of seven digital groups were created using the WhatsApp tool. On a weekly basis, and following a protocolised calendar, the material corresponding to each workshop was shared in the group, at a rate of one workshop per week. The material consisted of short videos and infographics. Once the contents of each workshop had been completed, the older volunteers contacted each person individually by telephone to monitor their viewing and impression of the materials, filling in a registration form. The Digital Group intervention ended with a face-to-face session in which the post-test was carried out.

#### 4.4 | Instruments

The following scales and measuring instruments were used for the pre- and post-tests:

- *Socio-demographic Questionnaire*: This is a series of items constructed ad hoc taking as a reference the Living Conditions Survey of the National Institute of Statistics (Instituto Nacional de Estadística 2023) and the Health Survey (Instituto Nacional de Estadística 2017) in which

the information shown in Table 1 is collected. Among the questions asked were gender, age, whether the person required any type of care, and with whom they lived. A social participation scale from the European Social Survey ESS (Eurostat 2022) is also included, where a higher score is interpreted as greater social participation. The questions included issues such as whether the person had collaborated with any political party, citizens' association platform, in any organisation or association, participated in campaigns or demonstrations, among other similar actions.

- *Health-Related Quality of Life*: The 12-item Short-Form Health Survey was used, developed by Ware, Kosinski, and Keller (1996) and validated for the Spanish population by Vilagut et al. (2008). It allows two general scores to be obtained: a score for the physical component (CSF-12) and another for the mental component (CSM-12). In its Spanish validation, a reliability index of 0.85 was obtained for the physical component and 0.78 for the mental component; a higher score is interpreted as a higher quality of life.
- *Perceived Social Support*: The MOS Social Support Scale, originally developed by Sherbourne and Stewart (1991),

**TABLE 2** | Content and objectives of the workshops delivered.

Name of the workshop	Contents	Objectives
1. Ageing process and active ageing	<ul style="list-style-type: none"> <li>Negative view of ageing and population ageing               <ul style="list-style-type: none"> <li>What is ageing?</li> <li>Pathologies linked to ageing                   <ul style="list-style-type: none"> <li>Active ageing</li> </ul> </li> </ul> </li> </ul>	(a) Understanding the natural process of ageing and the basis of active ageing
2. Physical activity for active ageing	<ul style="list-style-type: none"> <li>Physical changes that occur in old age               <ul style="list-style-type: none"> <li>What is physical exercise?</li> </ul> </li> <li>Physical exercise for older people               <ul style="list-style-type: none"> <li>Risk of falls and prevention</li> </ul> </li> </ul>	(a) Knowing the foundations and capacities of physical exercise in old age (b) Introducing new physical habits into daily life
3. Cognitive and emotional activity for active ageing	<ul style="list-style-type: none"> <li>Cognitive changes in ageing</li> <li>Emotional changes in ageing</li> <li>Compensation for daily 'forgetfulness'</li> </ul>	(a) Knowing and understanding the main cognitive changes in old age (b) Introducing strategies to improve cognitive performance
4. Nutrition and sleep for active ageing	<ul style="list-style-type: none"> <li>Healthy eating and nutrition in old age               <ul style="list-style-type: none"> <li>Healthy eating for active ageing                   <ul style="list-style-type: none"> <li>Sleep for active ageing</li> </ul> </li> </ul> </li> </ul>	(a) Knowing the relevance of healthy lifestyle habits in eating and sleeping (b) Introducing small daily habits that improve these areas of health
5. Social interaction for active ageing	<ul style="list-style-type: none"> <li>Social changes in ageing</li> <li>Benefits of social interaction</li> <li>Resources for social interaction</li> </ul>	(a) Knowing the changes in socialisation processes in old age (b) Providing resources to improve social interaction

was used. It was validated for the Spanish population by Revilla Ahumada et al. (2005). The scale is self-administered, and measures the person's perception of the availability of other people close to them who provide help and support in different areas. It is made up of 20 items that make up three dimensions or factors: emotional and informational support, affective social support and instrumental support. In the Spanish validation, reliability indices of 0.94 for factor 1, 0.85 for factor 2 and 0.87 for factor 3 were obtained. A higher score implies a higher level of social support.

- Depression:** The 15-question version of Yesavage's Geriatric Depression Scale, developed by Yesavage and Sheikh (1986) and validated in the Spanish population by Martínez et al. (2002) was used. It is indicated for application to people over 65 years of age.

All questionnaires and scales were self-administered through the Microsoft Forms platform and were completed by the entire sample. To this end, they were provided with a Tablet with access to the questionnaire, and the technical staff provided support when they needed it or had doubts. The socio-demographic questionnaire was applied only in the pre-test, and the rest of the scales were administered in both the pre-test and post-test.

## 4.5 | Data Analysis

First, descriptive statistics were obtained for the characteristics of the sample in each group for each of the variables measured. The reliability of the scales was analysed to determine

the internal consistency of each of them in this sample using McDonald's Omega index.

### 4.5.1 | Analysis of the Intervention in Quality of Life and Depression

A repeated measures ANOVA was carried out, where the two dimensions of quality of life were taken as dependent variables: physical health and mental health. It was carried out, on the one hand, on the sample of participants, distinguishing between FGProf, FGPeer and DG. The general analysis was carried out and, subsequently, incorporating care as a covariate. This variable was dichotomised into 1 (does require care) and 0 (does not require care). The analysis was repeated taking depression as the dependent variable.

### 4.5.2 | Analysis of the Intervention in Social Support

Similarly, a repeated measures ANOVA was performed with the social support as a dependent variable. The overall analysis was carried out and, subsequently, the living alone sample was filtered by the Loneliness variable. Social Participation was added as a covariate. The measures taken were pre- and post-intervention.

All the variables, both those measured in the pre-test and the post-test, were subjected to a parametric analysis in each group to see if the assumption of normality was met using the Shapiro-Wilk test. In each of the subsequent multivariate analyses, the assumption of homogeneity of variances was also checked using the Levene test. In all mean contrasts, the effect size was

calculated and interpreted on the basis of whether it was small, moderate or large.

This work had the support of the Ethical Committee of the Psychology Department of the University of Oviedo (Spain) and followed the principles for research with people contained in the Declaration of Helsinki of the World Medical Association (WMA).

JBI (Joanna Briggs Institute) critical appraisal checklist for quasi-experimental studies has been used. The study complies with the nine items of the checklist used (Data S1).

## 5 | Results

First, taking the total set of participants, Table 3 contains the scores in the different variables, at both pre- and post- moments. It also includes the reliability indices for each scale.

### 5.1 | Analysis of the Intervention in Quality of Life and Depression

When analysing the variables that make up quality of life, that is, physical and mental health, no statistically significant differences were observed in physical health within groups ( $F=2.275$ ;  $p>0.05$ ), nor between groups ( $F=0.4256$ ;  $p>0.05$ ) after applying the intervention. The same was true for mental health, where the result of the intragroup difference was ( $F=0.136$ ,  $p>0.05$ ), and between groups ( $F=0.981$ ,  $p>0.05$ ).

However, controlling for the care variable, the average physical health score for people in need of care goes from  $M(SD)=351.13(186.99)$  in the pre-measurement to  $431.81(171.85)$  in the post-intervention measurement, obtaining a statistically significant increase ( $F=8.460$ ;  $p<0.01$ ) when performing the intervention

in any of the exposure modalities, with a moderate effect size ( $\eta^2=0.061$ ), as shown in Table 4.

Figure 1 shows a marked trend towards improved physical health status within the DG. While in exploratory terms it appears that the pre-intervention physical health of the DG in need of care is lower than that of the other participants, the results in the comparison of means of the three groups in the pre-test show that there are no statistically significant differences (Welch's  $t=0.905$ ;  $p>0.05$ ). Similarly, there is also no different effect on physical health between the three forms of exposure to the intervention ( $F=2.348$ ;  $p>0.05$ ). This suggests that, while there is a tendency to improve physical health scores in the DG, the three exposure modalities (control, FGProf, as well as experimental, FGPeer and DG), have a similar effect on improving physical health among people in need of some form of care.

In the level of general mental health, no statistically significant differences were found between the pre-test and the post-test, neither between groups ( $F=1.653$ ;  $p>0.05$ ), nor within subjects ( $F=0.253$ ;  $p>0.05$ ). However, when taking the depression variable as a reference, the repeated measures analysis shows a significant change for the set of people participating in the intervention ( $F=4.604$ ;  $p<0.05$ ) (Table 5), with a low to moderate effect size ( $\eta^2=0.041$ ) within subjects. This was not the case between groups ( $>0.05$ ). However, Figure 2 shows that the DG has reduced its scale score the most. Although this group has higher depression scores in the pre-test than the subjects in the face-to-face groups, these differences are not statistically significant, as can be seen in the results of the between-subjects effects ( $F=0.005$ ;  $p>0.05$ ) in Table 5, and is corroborated by an independent samples mean difference test between people attending a digital or face-to-face workshop (Mann-Whitney  $U$  test= $2700.00$ ;  $p>0.05$ ). Active ageing for people requiring some form of care is effective in reducing the depression variable. While the digital exposure (DG) modality appears to yield

**TABLE 3** | Descriptive statistics of the scales and reliability indices obtained.

	Mean	SD	Minimum	Maximum	Reliability
Pre-test					
Quality of life	775.00	199.17	200	1.100	0.82
Physical health	448.11	154.18	25	700	
Mental health	249.11	55.74	100	350	
Depression	2.66	2.40	0	12	0.69
Social support	81.09	14.54	37	95	0.94
Post-test					
Quality of life	801.07	198.09	250	1.150	0.85
Physical health	466.66	152.30	25	700	
Mental health	254.88	56.11	75	400	
Depression	2.61	2.41	0	11	0.70
Social support	81.54	13.61	28	95	0.95

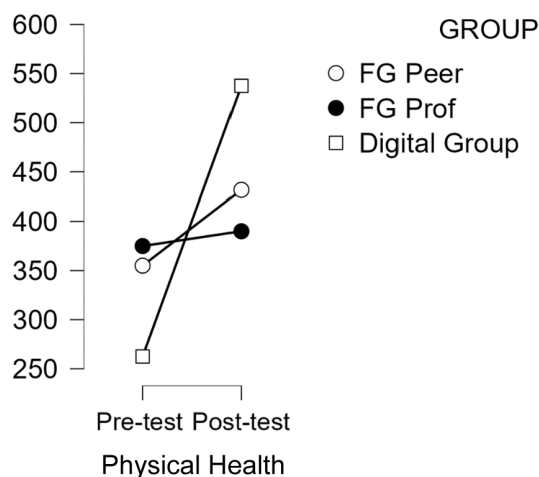
Note: Reliability estimated with McDonald's  $\omega$  coefficient. Abbreviation: SD, standard deviation.

**TABLE 4** | Results of the repeated measures ANOVA for physical health in the sample of participants in need of care.

Variables	Sum of squares	df	Mean square	F	p	$\eta^2$
Effects within subjects						
Physical health	87,681.159	1	87,681.159	8.460	0.009	0.061
Physical health*group	48,665.720	2	24,332.860	2.348	0.123	
Residuals	196,916.667	19	10,364.035			
Intersubject effects						
Group	1199.811	2	599.905	0.010	0.990	
Residuals	$1.108 \times 10^6$	19	58,304.825			

Note: Type III sum of squares.

Abbreviations: df, degrees of freedom;  $\eta^2$ , effect size.



**FIGURE 1** | Differences in the Physical Health variable in different groups in the sample of participants in need of care.

better results, these differences are trendline and not statistically significant. All three exposure modalities are effective in the same terms.

## 5.2 | Analysis of the Intervention in Social Support

In the second part of the analysis, a repeated measures ANOVA was performed with the Social Support dependent variable. No significant change was observed in the within-subjects measurement ( $F=0.04$ ;  $p>0.05$ ), although a significant change was observed in the between-groups measure ( $F=7.658$ ;  $p<0.01$ ). These differences lie in the fact that people who went to face-to-face workshops had significantly higher measures of social support than the DG sample, an issue that was repeated in the post-test. Therefore, in the pre-test the groups do not function equivalently, that is, they do not start from similar measurements in the social support variable. To overcome this initial heterogeneity in the sample, the same analysis was carried out by selecting people who reported living alone. Social participation was also incorporated as a covariate.

The results (Table 6) show no significant changes in social support in the within-subjects measurement ( $F=1.342$ ;  $p>0.05$ ) but

they are observed between the pre-test and post-test depending on the group to which one belongs ( $F=4.568$ ;  $p<0.05$ ), and also depending on the person's level of social participation prior to the start of the intervention ( $F=5.980$ ;  $p<0.05$ ). The effect sizes were respectively  $\eta^2=0.025$  and  $\eta^2=0.017$ .

Likewise, Figure 3 also shows more clearly that the three groups have similar levels of Social Support in the pre-test and that the face-to-face peer group is the one where the difference is more accentuated between the two periods. It shows, therefore, that social support grows in the experimental peer mentoring group (FGPeer) over the rest of the exposure modalities (control, FGProf and the other experimental group, DG).

## 6 | Discussion

The aim of this study was to analyse the effectiveness of a technologically supported microlearning intervention model designed through peer mentoring, aimed at the prevention of dependency and psychosocial well-being of the older population in a rural context.

In terms of mental health (depression) and physical health, the active ageing workshops are found to be effective, and moreover quickly (the project's intervention is brief), among people in need of some form of care, regardless of the intervention modality. These results support the lines of action that address active ageing through lifelong learning as a way to improve the quality of life in its physical and mental dimensions (Narushima, Liu, and Diestelkamp 2018). It also responds to one of the priority objectives of active ageing projects: improving physical health to delay dependency in older people (World Health Organization 2002).

Among those not in need of care, the mean physical health score shows an improvement (with  $M$  (SD)=466 (149.59) and 472 (151.36) in the pre- and post-measurements) but not statistically significant, which could be understood as having a preventive or maintenance function (Zhang, Litson, and Feldon 2022).

Where differences are observed depending on the type of educational intervention is in aspects related to social support. Peer-facilitated workshops, specifically in the face-to-face modality, were shown to be more effective among those living alone,

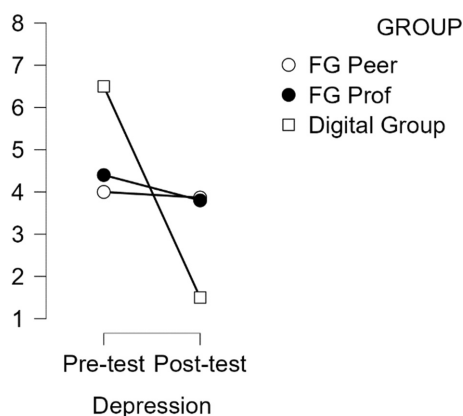


**TABLE 5** | Results of the repeated measures ANOVA for the depression variable in the sample of participants in need of care.

Cases	Sum of squares	df	Mean square	F	p	$\eta^2$
Effects within subjects						
Depression	21.438	1	21.438	4.604	0.045	0.042
Depression*group	20.920	2	10.460	2.246	0.133	
Residuals	88.467	19	4.656			
Intersubject effects						
Group	0.211	2	0.105	0.005	0.995	
Residuals	380.267	19	20.014			

Note: Type III sum of squares.

Abbreviations: df, degrees of freedom;  $\eta^2$ , effect size.



**FIGURE 2** | Differences in the Depression variable in different groups in the sample of participants in need of care.

significantly increasing the perception of social support and suggesting peer mentoring as a good strategy to combat loneliness in older people. These results also depended on the level of social participation of the subjects showing correlation with previous studies (Van Tilburg, Havens, and de Jong Gierveld 2004), which state that the opposite of isolation would be social participation and the opposite of loneliness would be the feeling of belonging or being socially integrated.

The methodological basis designed in this study, a peer mentoring methodology, implies that, through a process of activation of older volunteers, they have the opportunity to reach out to other older people. All this involves a process of activation and social participation of the population either in the role of the volunteer involved as a mentor or as a participant. In addition, the volunteers who played the role of mentors also participated in the design phase, trying to achieve maximum involvement in the project.

The socio-educational perspective implied by peer learning assumes, as a maxim, the viability of making the most of the ecological resources of life contexts to favour people's development processes. Thus, it is known that this methodology is effective and efficient at any stage of life (Alonso et al. 2024; Colvin and Ashman 2010). However, although there is a broad development of these techniques in childhood or youth stages, closely linked to formal educational contexts, this methodology is not used to the same extent in other stages of life, such as adulthood or old age.

Some peer mentoring experiences with older people have been aimed at either digital skills training (Korpela, Pajula, and Hänninen 2023) or the promotion of physical exercise (Stevens, Barlow, and Iliffe 2015). Although, unlike the present study, the former ones consisted of individual interventions through home visits or telephone care, both works highlighted the social aspect of peer mentoring methodology as a tool to combat loneliness in older adults and not only as a learning modality. Stevens, Barlow, and Iliffe (2015) analysed the results of this type of intervention from the perspective of the mentors, concluding that this social dimension was achieved through the mentor-mentee relationship, which they considered more effective when conducted face-to-face than by telephone. More closer to the present study is the work of Geffen et al. (2019) in which a peer mentoring programme was conducted with a similar sample (212 people over 60 years of age): the mentors conducted home visits in which healthy living was promoted and emotional and informational support was provided, referring to health and social services in case of need. The variables analysed were wellbeing, mood through anxiety and depression and social support using the MOS scale. As in the present paper, the results obtained showed a significant improvement in social support as well as in wellbeing and mood. At the end of the program proposed by Geffen et al. (2019), people felt less anxious, less depressed, less lonely and more physically and socially active. The authors concluded that peer mentoring programs are presented as an effective intervention to promote healthy ageing and to reduce loneliness.

Cuenca-Amigo, García-Feijoo, and Eizaguirre (2016) analysed peer learning and observed the various benefits of this method for both mentors and mentees, concluding that it has a positive impact not only on the subjects but also on society. For this to happen, it must be based on three basic pillars: freedom, gratuity and satisfaction. Firstly, the older person must choose to participate in the process freely, without coercion of any kind. Secondly, gratuity implies that the mentor carries out the activity as a volunteer, without extrinsic compensation of any kind. Finally, the process must bring satisfaction to the older person who participates.

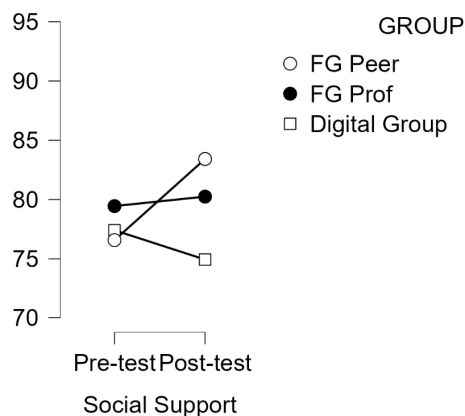
This paper therefore aims to provide further evidence for the effectiveness of peer learning with older people. The results in this case confirmed that the educational intervention that included the mentoring process through face-to-face groups facilitated by

**TABLE 6** | Results of the repeated measures ANOVA for the social support variable, with the social participation covariate, in the sample of participants living alone.

Variables	Sum of squares	df	Mean square	F	p	$\eta^2$
Effects within subjects						
Social support	86.837	1	86.837	1.342	0.252	
Social support*group	591.237	2	295.619	4.568	0.015	0.025
Social participation*group	386.976	1	386.976	5.980	0.018	0.017
Residuals	3365.005	52	64.712			
Intersubject effects						
Group	377.472	2	188.736	0.530	0.592	
Social participation	52.534	1	52.534	0.148	0.702	
Residuals	18,504.507	52	355.856			

Note: Type III sum of squares.

Abbreviations: df, degrees of freedom;  $\eta^2$ , effect size.

**FIGURE 3** | Differences in the social support variable in different groups in the sample of participants living alone.

peers showed a significant improvement in social support compared to digital groups and those facilitated by professionals.

The intervention model developed in this study also presents a bio-psycho-social perspective. It does so by taking into account that the educational content of the workshops is related to physical and cognitive aspects. However, the development modality is eminently interactive, which means that in a cross-cutting way it revolves around strengthening the social spheres of the population it focuses on.

The content of the workshops was delivered using a microlearning model, which has previously been shown to be a methodology that promotes effective and meaningful learning. Wang et al. (2020) conducted a systematic review of studies that have used microlearning projects to improve self-care skills in different types of populations and as prevention for the onset of pathologies (diabetes or cardiovascular diseases). They concluded that microlearning can positively influence individuals' cognitive self-care skills, but its effectiveness in triggering real behavioural change is limited. It appears to have the most impact when combined with supervision (such as monitoring daily medication

intake). Microlearning has also been used in healthcare workers for learning professional skills (De Gagne et al. 2019; Richardson et al. 2023); however, there is very little evidence of its use in active ageing promotion projects such as this one. In this study, educational interventions in this format had a significant effect on the perception of physical and mental health in older people in need of care, regardless of the mode of action. A trend of greater improvement was shown in the digital groups.

The design of this project has taken into account aspects such as the logic of proximity, considering that a basic principle for the development of quality of life in any context is that the resources and services are close to the population, and not that the population must adapt and/or travel to reach the resources (Skinner and Winterton 2018). With this approach, this project, whose dimension is rural, shifts its activity to the life contexts of the people who participate in it.

In addition, thanks to the methodology used, another essential element of healthy and active ageing is addressed: the digital inclusion of older people (World Health Organization 2020). The basic content of the actions that make up this project has a technological component; this element is inserted transversally throughout the project through its different possibilities: tools to generate content, communicate or evaluate results.

Among the limitations of this study is the time of the intervention, which does not allow us to observe relevant changes in many of the variables evaluated. However, this project has been proposed as a pilot study that will allow us to apply this methodology and the educational materials generated (Luna Abreu et al. 2023) on future occasions to implement Active Ageing programmes.

## 7 | Conclusions

Among the various principles included in this study are the promotion of active ageing through lifelong learning and social participation, the digital inclusion of older people,

participatory design, the bio-psycho-social perspective and the logic of proximity and the rural dimension. Therefore, its main contribution is the combination of all these elements in a single project.

Based on its implementation and the analysis of the data obtained, the results show that the educational intervention with microlearning is effective in improving physical and mental health (specifically, in depressive processes) in older people in need of care. No significant differences were observed between the different intervention modalities, although there was a trend towards greater improvement in the digital modality. On the other hand, the educational intervention does not seem to improve a priori the perception of social support in people living alone in a significant way, but there are significant differences in the effect depending on the intervention modality, with the face-to-face modality of peer-facilitated groups being more effective.

As a general conclusion of this study in relation to the effectiveness of the different modalities of educational intervention on active ageing, the peer-to-peer methodology seems to be as effective as the traditional one with a professional for the maintenance and improvement of health, and the face-to-face modality with peers is more useful if we think of the promotion of social support among people experiencing some degree of loneliness.

In order to propose future lines of research, further studies would be necessary where educational interventions of longer duration are carried out to see the functioning of these same variables over time. Also, and with the design and materials proposed, the behaviour of other variables can be observed, such as the influence of having to carry out care work, the perception of self-efficacy in older people, the socio-demographic conditions of rural areas or the influence of the digital divide on the processes measured. This paper aims to contribute to the development of this line of research.

#### Author Contributions

**Laura Mateos-González:** conceptualization, formal analysis, investigation, methodology, visualization, writing – original draft. **Sara Menéndez-Espina:** conceptualization, formal analysis, investigation, methodology, writing – original draft. **José Antonio Llosa:** investigation, methodology, funding acquisition, project administration, writing – review & editing. **Beatriz Oliveros:** data curation, project administration, supervision, writing – review and editing. **Esteban Agulló-Tomás:** methodology, supervision, visualization, writing – review and editing. **Estibaliz Jiménez-Arberas:** data curation, methodology, software, writing – review and editing.

#### Ethics Statement

This work had the support of the Ethical Committee of the Psychology Department of the University of Oviedo (Spain) and followed the principles for research with people contained in the Declaration of Helsinki of the World Medical Association (WMA).

#### Conflicts of Interest

The authors declare no conflicts of interest.

#### Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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## Supporting Information

Additional supporting information can be found online in the Supporting Information section.