Effectiveness of an Informal Home Care Support Intervention Program to Reduce Loneliness and Improve Quality of Life among Lonely Community-Dwelling Older Adults: A Feasibility Study

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Background: Establishing cost-effective informal care services for lonely older adults living at home in developing countries can be an innovative approach for improving their well-being. This study investigated the effectiveness of an informal home care support intervention program (HoSIP) reducing the loneliness and improving quality of life of lonely community-dwelling older adults.

Methods: This quasi-experimental pre-post study employed a non-randomized control group design with a 12-week intervention period and three follow-up points at the end of the HoSIP. Questionnaires were used to measure feelings of loneliness (20-item UCLA Loneliness Scale), quality of life (Control, Autonomy, Self-Realization and Pleasure Scale), general health (12-item General Health Questionnaire), social network (six-item Lubben Social Network Scale), social support (12-item Multidimensional Scale of Perceived Social Support), and self-care ability (17-item Self-care Ability Scale for the Elderly). Repeated-measures analysis of variance was used to gauge the effect of the intervention program over time and in comparison to the control group. Data analyses were performed using the IBM SPSS Statistics software (IBM Corp., USA).

Results: We found a significant relationship between the outcome variables, including feelings of loneliness (P<0.001) and quality of life (P<0.001), at different stages of measurement. Despite the positive feasibility results, the implementation of the HoSIP faced challenges due to a lack of facilities (e.g., place restriction for holding educational classes, educational facilities like computers, video projector, and whiteboard at daycare center) and the absence of supporting organizations.

Conclusion: Utilizing the existing capabilities of older adults to provide online and face-to-face care services can be a cost-effective way to improve their quality of life and reduce loneliness. The process of facilitating such informal care services for lonely older adults should be managed by either governmental or non-governmental organizations to reduce the rate of social isolation among this vulnerable population.

Keywords: Loneliness; Older Adults; Home Care; Quality of Life

Received: December 7, 2023, Revised: February 17, 2024, Accepted: February 20, 2024
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INTRODUCTION
Populations worldwide are aging owing to lower fertility rates combined with higher life expectancies. Moreover, the number of older adults living with complex health conditions is growing because of improvements in lifestyle choices, healthcare delivery, and living conditions. The number of older adults is predicted to exceed 2 billion by 2050, leading to an increased demand for accessible, affordable, and convenient social and healthcare services. However, advancements in the access to healthcare services and support are not uniform across nations. Particularly in developing countries, healthcare systems often lack the efficiency and capacity to respond to the increasing demands of the growing number of older adults. Consequently, attention to health and social factors is lacking, particularly for vulnerable populations with multiple chronic diseases, psychological disorders, and poor socioeconomic conditions. Living alone can compound these difficult circumstances and pose a threat to older adults’ quality of life. By contrast, the majority of older adults prefer to live independently in their own homes; as long as their health and well-being are maintained, they live in their own home within their community. Despite conflicting research evidence, older adults living alone may be at a higher risk of loneliness compared to those who are not living alone. Based on prior studies, the use of technology can be a reasonable solution to reduce social isolation and a lack of companionship, as well as support aging in place. Using the internet and online social networks can effectively alleviate feelings of loneliness among older adults living alone at home. It has also been reported that utilizing new technologies can enhance older adults’ quality of life. Creating friendly relationships through virtual space membership can reduce loneliness among older adults. Through participation in online social networks, older adults can connect, provide mutual support, and share important information.

Recent findings have shown that older adults using online social networks benefit from a higher level of cooperation and psychological well-being as they can make new friends and expand their social networks; this gives meaning to their lives by improving their interpersonal relationships. Therefore, peer-to-peer support programs in the context of online social networks show great promise as an effective approach to facilitate mutual emotional and informational support. One study revealed the positive effects of engagement in online programs, which offers a possibility of sharing and communicating similar thoughts and promoting social participation.

Owing to advancements in technology and older adults’ improved accessibility to online social networks, this study sought to examine how a community-based peer-to-peer online network can support older adults in meeting their care needs, and assess whether this improves their social and psychological health. Furthermore, we hypothesized that utilizing four types of support (emotional, instrumental, informational, and affiliative) on online social networks and face-to-face visits would reduce feelings of loneliness and improve quality of life. Therefore, the current study aimed to evaluate the effectiveness of a peer-to-peer informal home care support intervention program (HoSIP) in reducing loneliness and improving quality of life among lonely community-dwelling older adults, as a feasibility study.

METHODS

1. Study Design
This study was the second phase of a feasibility study aimed at designing, implementing, and evaluating an informal HoSIP for lonely community-dwelling older adults in Gorgan, Iran. The protocol was registered in the Iranian Registry of Clinical Trials (IRCT20190503043455N1) and published elsewhere.

The current study was a quasi-experimental pre-post study conducted using a non-randomized control group design, with assessments at the end of a 12-week intervention period and at 3 and 6 months post-intervention. Ethical approval was obtained from Tabriz University of Medical Sciences, Tabriz, Iran (IR.TBZMED.REC.1399.

![Figure 1. Feasibility study procedure: design, implementation, and evaluation of an informal home care support intervention program (HoSIP) among lonely older adults.](https://doi.org/10.4082/kjfm.23.0269)
All participants provided written informed consent. Figure 1 illustrates the procedure for conducting a mixed-method concurrent embedded design. The results associated with the qualitative phase are reported in a separate article.

2. Participants and Setting
In the first phase of the study (cross-sectional study), the researcher explained the HoSIP to the participants who met the inclusion criteria for the intervention program. Based on the calculated sample size in the protocol article, 27 lonely older adult participants with a 95% confidence interval and 80% power were included in the intervention program, which increased to 32 individuals considering a potential attrition rate of 15%. While completing the questionnaires at the cross-sectional phase, 60 older adults primarily agreed to participate in the HoSIP. The researcher invited them to a briefing session at the daycare center, Kanoon Salmandi Jahandidegan, to explain the intervention program. Only 41 older adults (35 women and six men) were present at the daycare center. Four of the older women were not in Gorgan; therefore, they attended the meeting online. At the end of the briefing session, five older women resigned from the HoSIP owing to the coronavirus disease 2019 (COVID-19) outbreak. Finally, 36 older adults (six men and 30 women) agreed to participate. A personal file containing demographic information and an informed consent form was created for each participant and confidentially maintained at the center. To prevent contamination bias, the control group was recruited from outside of Gorgan City. Figure 1 depicts the selection and follow-up procedures of the study population.

The main settings of the intervention program were participants’ homes, the daycare center (Kanoon Salmandi Jahandidegan), and outdoor environments (cafés, restaurants, parks, shopping centers, etc.). Owing to commuting restrictions imposed by the government during the COVID-19 outbreak, participants had to perform certain activities (e.g., teaching literacy, going out together, and going out for walking) in outdoor environments, such as parks, which were outside their homes.

3. Inclusion Criteria
We asked single-household older adults living alone (based on Golestani healthcare registration) about the subjective criteria for loneliness—those who had been living alone for at least 9 hours per day during the previous 2 weeks, and those not receiving at-home assistance. The inclusion criteria were (1) being 60 years or older, (2) being a resident of Gorgan City, and (3) having the ability to use a smartphone or stationary phone. Eligible individuals had the interest, ability, and willingness to participate in the study.

4. Intervention Procedure (HoSIP)
The intervention group was named HAMDAM (Persian), and all participants were registered in this group. An online social group with the same name was created on WhatsApp (WhatsApp LLC, Menlo Park, CA, USA). Participants who used smartphones were registered in the online HAMDAM group. During the briefing session, the researcher (E.L.) explained that any participant needing specific help could write their requests daily in the online group. These requests could include instrumental assistance (e.g., shopping), emotional support (e.g., empathy and encouragement), informational help (e.g., knowledge translation), and affiliation (fostering social relationships between lonely older adults, reinforcing the sense of belonging). A registered HAMDAM peer could then respond to meet this requirement. Participants without a smartphone or those who were illiterate could directly contact the research team (the researcher, E.L., and two trained research assistants) via phone calls if they needed special informal services. The research team members would then post the request to the online HAMDAM group so that peer volunteers could respond. The researcher (E.L.) emphasized that providing these informal services (peer-to-peer) was free, and that participants should not expect any remuneration for their service.

During the briefing session, all participants were asked to introduce themselves, discuss their abilities, and express their needs. The researcher noted these abilities and needs. The participants proposed holding educational and art classes (group sports, English, computers, literacy, knitting, and discussion group sessions) for each other. These classes were held at the daycare center in Gorgan. In the online group, participants could ask questions about daily routines and their peers responded to them. If participants in the online group were not in a good mood, they could easily write or send audio messages about their emotional problems, and other members provided emotional relief. Furthermore, participants provided each other with instrumental support, including shopping and cooking, when required. They also organized bimonthly birthday parties for each other. All these ceremonies and group camps were either held at daycare center or in restaurants and traditional cafés.

In the early days of the intervention period, older adults felt challenged expressing their needs in the online HAMDAM group on WhatsApp because of embarrassment and unfamiliarity with each other. Some participants who were not yet oriented towards the intervention procedure sent numerous messages and entertainment videos unrelated to their needs. Consequently, the researcher established a complementary online social network called Empathetic Dialogue, in which all the participants were registered. This additional online group facilitated better acquaintance among the participants and served as an ice-breaking channel. The participants received training on communicating their daily needs through the online HAMDAM group. All activities were documented in the participants’ personal files. Each morning, the researcher (E.L.) sent health messages about aging via the online HAMDAM group.

The researcher recruited a control group from Aliabad-E Katul, a city in Golestani Province that shares similar cultural and economic characteristics with Gorgan City. Based on the health records in the Health Center of Aliabad-E Katul, Iran, 60 lonely community-dwelling older adults (aged ≥60 years) were randomly invited to participate in the study. Trained interviewers collected data over 7 days, between 9
AM and 2 PM. All participants were informed of the purpose of the study and provided written informed consent. The control group did not participate in the intervention program. Figure 2 illustrates the CONSORT (Consolidated Standards of Reporting Trials) framework used for selecting the experimental and control groups.

5. Data Collection
Sociodemographic characteristics, including age, sex, education, job, ethnicity, and proximity to children, were collected. The questionnaires used included the 20-item UCLA Loneliness Scale,15) a six-item Lubben Social Network Scale,16) a 12-item Multidimensional Scale of Perceived Social Support,17) a 17-item Self-care Ability Scale for the Elderly,18) a 17-item Self-care Ability Scale for the Elderly,18) a 12-item General Health Questionnaire,19) and the Control, Autonomy, Self-Realization and Pleasure Scale.20) The validity and reliability of all questionnaires have been evaluated in Iran. All details related to the questionnaires are reported in the protocol article13) and the cross-sectional study.14) These questionnaires were completed by both the intervention and control groups before the start of the intervention program, immediately after the intervention, and at 3 and 6 months post-intervention. The researcher (E.L.) supervised the HoSIP, and two trained research assistants accompanied the researcher in data collection and all procedures related to the HoSIP.

6. Data Analysis
Statistical analyses were conducted using IBM SPSS Statistics software ver. 28.0 (IBM Corp., Armonk, NY, USA). The normality of numeric variables was checked using the Kolmogorov-Smirnov test. Data are presented as mean±standard deviation and median (min–max) for normal and non-normal numeric variables, respectively, and as frequency (percentage) for categorical variables. The internal consistency reliability of the measures was assessed using Cronbach’s α, and the results supported adequate internal consistency for the subscales, as well as for the physical and mental scales and the total score (all >0.7). Between-group comparisons of baseline measures and demographic variables were performed using Fisher-Freeman-Halton exact tests, where appropriate.

For within-group comparisons among the data collected at the 3 times of measurement (immediately after intervention and 3 and 6 months after intervention), a two-way analysis of variance (ANOVA) with repeated-measures ANOVA (RMANOVA) was used. The assumption of sphericity was assessed using the Mauchly test, and the Greenhouse-Geisser correction was applied to correct deviations from the assumption. Where RMANOVA was significant, the results were subjected to the Sidak post-hoc test. All analyses were performed using the per-protocol approach, and P-values less than 0.05 were considered significant.

RESULTS
A total of 36 and 51 older adults participated in the intervention and control groups, respectively. The mean age of the participants in the intervention group was 68.36±5.47 years, of whom 83.3% were women. The two groups differed in education levels and occupations. In the control group, the highest educational level was primary education (58.8%), whereas in the intervention group, 33.3% had primary education and 38.9% had secondary education. Over one-third of the partici-
Participants (n=13 [36.1%]) received old-age pensions. Significant differences were observed between the two groups in terms of education (P<0.001) and occupation (P<0.001) (Table 1).

Table 2 shows the results of the RMANOVA examining the interaction effects between the two groups at different measurement intervals for the six variables of loneliness, self-care ability, social support, social networks, general health, and quality of life. The results of the RMANOVA for loneliness, quality of life, and perceived social support indicated that the assumption of equality of means in different stages of measurement was rejected: (P<0.001, F=15.915), (P<0.001, F=15.915), (P<0.001, F=15.915).

Table 1. Participants’ characteristics in the intervention and control group

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Intervention group</th>
<th>Control group</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young old (60–74)</td>
<td>32 (88.9)</td>
<td>37 (72.5)</td>
<td></td>
</tr>
<tr>
<td>Old-old (75–84)</td>
<td>3 (8.3)</td>
<td>13 (25.5)</td>
<td></td>
</tr>
<tr>
<td>Oldest-old (&gt;85)</td>
<td>1 (8.2)</td>
<td>1 (2.0)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>0.514</td>
</tr>
<tr>
<td>Men</td>
<td>6 (16.7)</td>
<td>5 (9.8)</td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>30 (83.3)</td>
<td>46 (90.2)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Illiterate</td>
<td>4 (11.1)</td>
<td>21 (41.2)</td>
<td></td>
</tr>
<tr>
<td>Primary education</td>
<td>12 (33.3)</td>
<td>30 (58.8)</td>
<td></td>
</tr>
<tr>
<td>Secondary education</td>
<td>14 (38.9)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Tertiary education</td>
<td>6 (16.7)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Retirement</td>
<td>12 (33.3)</td>
<td>1 (2.0)</td>
<td></td>
</tr>
<tr>
<td>Pensioner</td>
<td>13 (36.1)</td>
<td>24 (47.1)</td>
<td></td>
</tr>
<tr>
<td>Household</td>
<td>9 (25.0)</td>
<td>23 (45.1)</td>
<td></td>
</tr>
<tr>
<td>Others (freelancer, part-time job)</td>
<td>2 (5.6)</td>
<td>3 (5.9)</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td>0.067</td>
</tr>
<tr>
<td>Fars</td>
<td>33 (91.7)</td>
<td>49 (96.0)</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>3 (8.3)</td>
<td>2 (4.0)</td>
<td></td>
</tr>
<tr>
<td>Proximity to children's house</td>
<td>20 (55.6)</td>
<td>38 (74.5)</td>
<td>0.109</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>16 (44.4)</td>
<td>13 (25.5)</td>
<td></td>
</tr>
</tbody>
</table>

Values are presented as number (%).

Table 2. Repeated measures analysis examining interaction effects between two groups at different measurement intervals

<table>
<thead>
<tr>
<th>Model</th>
<th>Variable</th>
<th>Within-subjects effects</th>
<th>Between-subjects effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Sphericity assumed</td>
<td>Greenhouse-Geisser</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group</td>
<td></td>
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<tr>
<td>Loneliness</td>
<td>UCLA</td>
<td>-</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>UCLA*Group</td>
<td>-</td>
<td>0.026</td>
</tr>
<tr>
<td></td>
<td>Group</td>
<td>-</td>
<td>- 0.006</td>
</tr>
<tr>
<td>Quality of life</td>
<td>CASP</td>
<td>&lt;0.001</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>CASP*Group</td>
<td>&lt;0.001</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Group</td>
<td>-</td>
<td>- 0.243</td>
</tr>
<tr>
<td>Perceived social support</td>
<td>MSPSS</td>
<td>-</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>MSPSS*Group</td>
<td>&lt;0.001</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Group</td>
<td>-</td>
<td>- 0.165</td>
</tr>
<tr>
<td>Social network</td>
<td>LSNS</td>
<td>-</td>
<td>0.044</td>
</tr>
<tr>
<td></td>
<td>LSNS*Group</td>
<td>-</td>
<td>0.300</td>
</tr>
<tr>
<td></td>
<td>Group</td>
<td>-</td>
<td>- 0.002</td>
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<tr>
<td>Self-care ability</td>
<td>SASE</td>
<td>0.501</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>SASE*Group</td>
<td>&lt;0.001</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Group</td>
<td>-</td>
<td>- 0.282</td>
</tr>
<tr>
<td>General health</td>
<td>GHQ12</td>
<td>-</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>GHQ12*Group</td>
<td>0.001</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Group</td>
<td>-</td>
<td>- 0.040</td>
</tr>
</tbody>
</table>

UCLA, UCLA loneliness; CASP, Control, Autonomy, Self-realization, and Pleasure; MSPSS, Multidimensional Scale of Perceived Social Support; LSNS, Lubben Social Network Scale; SASE, Self-care Ability Scale for the Elderly; GHQ12, General Health Questionnaire.
F=16.499), and (P<0.001, F=8.362), respectively; there was a significant relationship between different stages of measurement. The between-group test results indicated significant interaction effects within the intervention and control groups: (P=0.006, F=7.872), (P<0.001, F=26.893), and (P<0.001, F=16.774), respectively (Figure 3A–C).

The results of the RMANOVA for general health and social network indicated that the assumption of equality of means in different stages of measurement was rejected: (P<0.001, F=12.753) and (P=0.044, F=3.033), respectively; there was a significant relationship between different stages of measurement. The results of the between-group test indicated that the interaction between the intervention and control group was not significant: (P=0.065, F=3.500) and (P=0.659, F=0.196), respectively (Figure 3D, E).

Based on the results of the RMANOVA, the assumption of equality of means for self-care ability in different stages of measurement was not rejected (P=0.501, F=0.790), indicating a significant relationship between the different stages of measurement. The results of the between-group test indicated that the interaction between the intervention and control group (P<0.001, F=33.434) was significant (Figure 3F).

To design the study objectives and guiding questions for the feasibility study, we referred to the work of Orsmond and Cohn.21) Table 3 presents the objectives and guiding questions for the feasibility study.

**DISCUSSION**

This study was the first to examine the feasibility of a peer-to-peer intervention program designed to support lonely older adults in an Iranian community. Our findings suggest that this community-based intervention is feasible and acceptable for this target population. Our results also demonstrate that the intervention might reduce loneliness and improve quality of life among older adults. Receiving support from peers on an online platform and through interpersonal communication provided opportunities for the participants to expand their social networks, increase their social support, and decrease their feelings of loneliness.

Our results are consistent with those of a rapid systematic review in which video communication interventions among older adults reduced loneliness and improved social support. According to the social capital theory, the quantity of social interactions directly correlates with the amount of social capital one possesses.22) Social capital promotes psychological well-being and motivates individuals to participate in online community activities. It not only provides instrumental support but also enhances emotional support, ultimately alleviating feelings of loneliness.

Given that a portion of the intervention program leveraged online social media (WhatsApp), the beneficial outcomes stemmed from online interactions with peers during the COVID-19 pandemic. The on-
Table 3. Objectives and guiding questions for a feasibility study

<table>
<thead>
<tr>
<th>Objective</th>
<th>Main question</th>
<th>Contents</th>
</tr>
</thead>
</table>
| Objective 1: Evaluation of recruitment capability and resulting sample characteristics | Can we recruit appropriate participants? | • Thirty percent dropout rate was considered to prevent possible dropout of older adults from the HoSIP. 
• Sixty lonely older adults from the cross-sectional study were invited. Forty-one lonely older adults (35 women and 6 men) took part in the briefing session. Five older women withdrew due to a COVID-19 outbreak and health complications. Finally, 36 lonely older adults agreed to participate. 
• Ninety-seven percent of participants were able to use smartphone and online social network. 
• Traditional cultural attitudes and religious beliefs towards communication between unfamiliar men and women posed a significant challenge. The interaction between genders was lower in this study, which negatively affected their need announcement and mutual support. 
• Few potential older adults from cross-sectional study agreed to participate in HoSIP due to: - COVID-19 outbreak and successive peaks of COVID-19 made it difficult to attract additional lonely older adults. 
- Since such intervention community-based study has not ever conducted among Iranian older adults, some older adults were skeptical about overall safety of HoSIP because they did not like to have strangers visited their homes. |
| Objective 2: Evaluation and refinement of data collection procedures and outcome measures | How appropriate are the data collection procedures and outcomes measures for the intended population and purpose of the study? | • 2/3 of participants did not understand the questions correctly so the researcher and research assistant read items to all older adults and completed written pre- and post-intervention questionnaires, which reduced response bias. 
• The results related to psychometric properties of the measures indicated that they were in line with what had been shown in previous studies in the similar populations. 
• There was no need to develop new measures because the measures were aligned with the theoretical perspectives and hypothesized of the HoSIP intervention and quantitative questionnaires and qualitative interviews could evaluate the effects of the intervention. |
| Objective 3: Evaluation of acceptability and suitability of intervention and study procedures | Are the study procedures and the intervention suitable for and acceptable to participants? | • The acceptability and suitability of HoSIP intervention through quantities and qualitative feedbacks from lonely older adults. 
• After a 3-month intervention program, constant feedback from participants indicated that a 12-week intervention program was too short. Although all participants remained for up to 6 months, our intervention lasted only 3 months. In other words, from the 3rd to the 6th months after intervention, we did not have any intervention, and after the 6th month, we only collected the second post-test data. So, our intervention lasted only 3 months. It is noteworthy that from the 3rd month until the 6th month (with all participants), and even till now (2/3 of members of the participants), the group has been active and stands alone without any intervention or communication from the research team. 
• The HoSIP intervention fitted with the daily life activities of lonely older adults. It was revealed that all tasks associated with the HoSIP intervention were very well understood by lonely older participants. Participants were informed how to express their needs in online social network and how to support each other based on the researcher’s explanations. |
| Objective 4: Evaluation of resources and ability to manage and implement the study and intervention | Does the research team have the resources and ability to manage the study and intervention? | • There were no difficulties associated with experiences of working with older adults. Researchers had previous experiences in carrying out multi-stage research studies. 
• Due to the outbreak of COVID-19 and commuting restrictions, older adults were required to hold their face-to-face classes and meetings at Kanoon Salmani Jahandidegan on designated weekdays. 
• Although older adults had adequate space to implement their meetings and classes, there was a shortage of some facilities such as availability of computers, whiteboard for older learners in the day care center. Therefore, the older adults had to adjust their plans according to the permissions granted by the day care center’s manager, which resulted in some discomfort among the participants. 
• A major challenge was the inadequacy of the financial budget and resources provided by Tabriz University of Medical Sciences. Unfortunately, some unanticipated expenditures were imposed directly upon the research team due to COVID-19 outbreak. Then, the researchers had to spend out of pocket to continue the project in the community. |
| Objective 5: Preliminary evaluation of participant responses to intervention | Does the intervention show promise of being successful with the intended population? | • To investigate whether the HoSIP intervention has the potential to being successful in lonely older adults, all scores on pre- and post-test measures were evaluated and also reviewed qualitative feedbacks from older adults. Over time, the mean scores of all variables in the intervention group exhibited positive changes. 
• The study indicated that lonely older adults observed positive changes in their lifestyle. |

HoSIP, home care support intervention program; COVID-19, coronavirus disease 2019.

line interaction acted as a strong social and emotional support by reducing depression, which is consistent with previous findings regarding online intervention through peer support relieving depression among older adults.\(^{11}\) In this study, the perceived social support in the intervention group improved in the three follow-up periods. One probable explanation for this could be that support from older peers is more acceptable in comparison to support from other people\(^{20}\) because of the mutual understanding among older adults regarding shared experiences of loneliness, especially in online peer-to-peer communication.\(^{20}\) This result is consistent with those of previous studies that have shown that older peers are more likely to ignore each other’s faults; thus, they do not become frustrated while giving or receiving support. Improvements in self-care ability in the intervention group were ob-
served post-intervention and at the 3- and 6-month follow-ups, compared with the control group. This reflects the HoSIP approach’s influence in facilitating mutual educational support. A quasi-experimental study that included peer mentors to promote self-care behaviors among older adults with type II diabetes mellitus showed that the mean blood-glucose and glycated hemoglobin index decreased in the experimental group compared with the control group.\(^{22}\) Thus, a peer support program plays an effective role in increasing self-efficacy, self-care, and knowledge levels and decreasing hospital readmission. These results can be attributed to patients’ confidence and experiences regarding the effectiveness of techniques that their peers with similar conditions have applied in their lives.\(^{23}\) Another possible explanation is that older peer mentors typically have equal levels of knowledge of the aging process; thus, they respect and empathize with each other. Peer-mentored programs are not only more attractive for older adults but may also support their commitment to participate in these activities.\(^{27}\)

In the present study, the mean score of quality of life increased significantly after participation in the intervention program. This may be partly explained by the positive influence of self-care education programs on psychosocial aspects of quality of life.\(^{28}\) Through the information obtained in online discussions and face-to-face interactions, older adults in the intervention group may have been able to apply self-care management strategies that help them take control of their chronic disease at home and allow them to live independently as long as possible.\(^{29}\)

There were no significant differences in general health scores between the intervention and control groups, nor were these scores associated with the negative impacts of the COVID-19 outbreak, such as the death of close friends or social isolation.\(^{29}\) Longer quarantine periods resulted in feelings of loneliness, disturbed sleep patterns, psychological distress, and decreased physical activity, which were the determining factors in the general health questionnaire. Thus, the COVID-19 pandemic has indirectly affected older adults’ mental health.

Unlike previous studies that have focused on online emotional support,\(^{12,23}\) we considered four aspects: instrumental, emotional, affiliative, and informational support. Moreover, in previous studies, older volunteers were recruited to conduct intervention programs for their peers.\(^{27,28}\) However, in the HoSIP, all participants supported each other and did not receive any external help from older volunteers. Furthermore, after the completion of the HoSIP project, almost two-thirds of the participants remained in the group of HoSIP intervention, and continued to assist each other without any involvement or correspondence from the research team. This demonstrates the long-lasting impact of our intervention program 2 years later.

This study has several limitations. First, it was conducted during the COVID-19 pandemic. Therefore, unexpected events, including the deaths of older-adult relatives due to COVID-19 and longer durations of quarantine, might have affected the quality of the participants’ responses to the questions, which were beyond the control of the researcher. Second, fear of COVID-19 and dissatisfaction or uncertainty regarding the intervention strategy among their children led some eligible community-dwelling older adults to abstain from participating, thereby reducing the final sample size. Third, there were large educational differences between the intervention and control groups, and the intervention group had higher levels of education, compared to control group. This study used a quasi-experimental pretest-posttest method with a control group. Therefore, future research should use randomized controlled trials to increase the level of evidence associated with these kinds of community-based intervention programs for lonely older adults. Furthermore, although the present results are informative, the intervention may work in other settings if differences in culture, social norms, and religion are considered.

In conclusion, our findings suggest that the HoSIP reduces feelings of loneliness and improves the quality of life among lonely older adults residing in Iranian communities. Given the rapid increase in the aging population in developing countries, such as Iran, and the socioeconomic challenges they face in delivering new healthcare services, implementing programs similar to the HoSIP could be a cost-effective strategy to enhance quality of life and alleviate loneliness among older adults. These programs can leverage the existing capabilities of older adults to provide mutual online and face-to-face care services. This approach not only benefits and empowers older adults, but also aids the healthcare systems of these countries by promoting the use of community resources aimed at improving the health of older adults residing in the community. Facilitation of such informal care services for lonely older adults should be overseen by either governmental or non-governmental organizations to reduce social isolation rates among this vulnerable population.

**CONFLICT OF INTEREST**

No potential conflict of interest relevant to this article was reported.

**ACKNOWLEDGMENTS**

We would like to thank the participants and the daycare authorities in Gorgan City and Aliabad-E Katul County (Kanoon Salmandi Jahandi-degan and Yas), without whose help this work would never have been possible.

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