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Interventions for improving health literacy among older people: a systematic review

Mehran Sardareh[1,2], Hossein Matlabi[3,4], Ali Reza Shafiee-Kandjani[5], Rona Bahreini[6], Salar Mohammaddokht[7,8] and Saber Azami-Aghdash[8*]

Abstract

Background Health literacy(HL) is defined as the degree to which individuals have the capacity to obtain process and understand basic health information and services required for making appropriate health decisions. Effective interventions to improve older people's HL have become increasingly important. The purpose of this study is to conduct a review of interventions aimed at enhancing the HL of older people.

Methodology Relevant information was gathered from various databases including PubMed, Scopus, Cochrane Library, Science Direct, and Web of Science. Additionally, a manual search of related journals and Google Scholar, a search of the reference lists of selected articles, and a search of unpublished sources were also conducted up to 30 August 2024. Reporting quality assessment was performed using CONSORT: 2010, JBI Critical Appraisal Checklist for Quasi-Experimental Studies, and "Quality Assessment Criteria for Survey Research Reports".

Results A total of 21 articles were included in this study. The interventions conducted in high-income countries were found to be more effective compared to those conducted in middle and low-income countries. Furthermore, interventions carried out at the community level were more effective than those performed in nursing homes. Educational interventions were more effective than lifestyle modification interventions, and interventions carried out in a single dimension were more effective than multidimensional interventions. Additionally, interventions that utilized technology were found to be more effective.

Conclusion Based on the findings, community-based interventions that encompass a one-dimensional approach, incorporating the use of technology and considering the duration of the intervention, are more recommended.

Keywords Aging, Health literacy, Intervention, Older people, Health knowledge

*Correspondence:
Saber Azami-Aghdash
s.azami.a90@gmail.com
[1]School of Management and Medical Informatics, Tabriz University of Medical Sciences, Tabriz, Iran
[2]Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran
[3]Department of Geriatric Health, Tabriz University of Medical Sciences, Tabriz, Iran
[4]Research Center for Integrative Medicine in Aging, Aging Research Institute, Tabriz University of Medical Sciences, Tabriz, Iran
[5]Research Center of Psychiatry and Behavioral Sciences, Tabriz University of Medical Sciences, Tabriz, Iran
[6]Iranian Center of Excellence in Health Management (IceHM), Tabriz University of Medical Sciences, Tabriz, Iran
[7]Medical Philosophy and History Research Center, Tabriz University of Medical Sciences, Tabriz, Iran
[8]Tabriz Health Services Management Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

Introduction

Aging is a wholly natural process that spans from birth to death. Aging is a unique experience that can be perceived differently by each individual [1]. Due to declining death and fertility rates, along with increased life expectancy and shifts in population age structure from the young to the older people, the world is currently experiencing a rapid and significant trend toward population aging [2]. According to the 2020 report of the United Nations Economic and Social Department, the global older people population has grown more than fivefold between 1950 and 2020 [3]. According to projections by the aforementioned organization, the percentage of the world's population aged over 65 is estimated to reach 7.11% by 2030, followed by an increase to 9.15% by 2050 and a significant rise to 22.6% by 2100 [4, 5]. It is projected that by 2050, the global older people population will reach nearly two billion individuals [6].

The growth of the older people population worldwide is regarded as a significant challenge for healthcare service providers, families, and society at large [7], The aging population faces potential challenges such as chronic diseases, loneliness, isolation, and deprivation. The lack of social support poses a threat to their well-being, making them more susceptible to psychological problems than at any other stage of life [8]. Older people with low Health Literacy (HL) use more emergency services, have higher health care costs, use less preventive services such as vaccinations and mammograms, and are associated with higher mortality [9]. Given the extensive health challenges faced by older people, experts in this field strongly recommend self-care practices and effective communication with healthcare providers [10] This necessitates having adequate HL [11]. HL refers to the ability of individuals to obtain, comprehend, and apply basic health information and services to make appropriate decisions regarding their well-being [12] HL encompasses various skills, including reading, writing, critical analysis, decision-making, and the practical application of these skills in health-related situations [13]. It is important to note that HL is not solely dependent on educational attainment or general reading ability [14]. Possessing adequate HL can significantly contribute to the overall well-being and health of the older people population, promoting a healthier lifestyle [15].

Previous research has focused on addressing well-known issues faced by older people, such as social isolation, low self-confidence, inadequate access to appropriate health information, and unhealthy lifestyles [16]. Many programs have been designed to improve communication skills, self-management abilities, HL, physical activity levels, nutritional knowledge, medication understanding, and overall quality of life for older people [17–22]. In recent years, there has been a growing recognition of the significance of HL in enhancing the overall health of older people. As a result, numerous countries have developed and implemented various interventions aimed at promoting HL among older people [23–28]. This study aims to conduct a systematic review of the effectiveness and characteristics of interventions implemented to enhance HL among individuals aged 60 and above. By providing accurate and comprehensive information on the design and implementation of these interventions, this study aims to offer valuable insights that can be utilized by policymakers and healthcare system managers.

Materials and methods

This systematic review was conducted in 2024 following the guidelines provided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guide [29].

Literature search

The information for this systematic review was collected from various databases including PubMed, Scopus, Science Direct, and Web of Science. Relevant keywords were selected through a review of primary texts, consultation with subject experts, and utilizing keywords available in the Mesh (Medical Subject Headings) database. The search strategy was developed and executed by an experienced librarian, guided by an expert in the subject area (Appendix 1 - Search strategy in databases). The search period for articles was extended until up to 30 August 2024. To ensure comprehensive coverage, additional manual searches were conducted in relevant journals and Google Scholar. After removing articles weakly related to the study objectives, the selected articles and their references were further searched online to enhance reliability in identifying and reviewing existing literature. Subject experts were also engaged throughout the research process. To include unpublished sources (grey literature), databases such as the European Association for the Exploitation of Gray Literature (EAGLE) and the Healthcare Management Information Consortium (HMIC) were explored.

The inclusion and exclusion criteria

The inclusion criteria:

1. The older people over 60.
2. Community-based interventions to improve HL (Because these interventions are expected to be more suitable for the study. The definitions of community-based interventions in scientific literature [30] and the opinions of the research team members helped determine whether the reported interventions in the studies were community-based or not.)

3. All outcomes related to HL of older people.
4. Studies published in English.
5. Survey studies that reported the results of community-based interventions were also included in the study.

The exclusion criteria:

1. Econometric and Feasibility studies.
2. Protocols.
3. Non-original studies (letter to editors).

Reporting quality assessment

To assess the reporting quality of the clinical trial studies obtained from the selected databases using the mentioned keywords, two evaluators utilized the Consolidated Standards of Reporting Trials (CONSORT: 2010) checklist. The choice of this checklist was based on its relevance for evaluating interventional studies, specifically clinical trials. Moreover, its translation and validation in the Persian language were considered to evaluate the articles in this study [31]. The CONSORT evaluation tool is widely recognized as one of the most important tools for assessing clinical trial articles. It was introduced in the mid-1990s by a group of clinical trial experts, statisticians, and epidemiologists to establish an international standard for reporting clinical trials. The latest version of this checklist, CONSORT 2010, comprises 37 items that assess six main areas of clinical trial studies. These sections include title and abstract, introduction, materials and methods, results, discussion, and other information. Each section consists of various components for evaluation [32–34]. Additionally, the JBI Critical Appraisal Checklist for Quasi-Experimental Studies was utilized to evaluate the reporting quality of quasi-experimental studies. This checklist provides specific criteria for assessing the methodological rigor and reporting standards of quasi-experimental study designs [35]. For the qualitative assessment of survey studies, a checklist called "Quality Assessment Criteria for Survey Research Reports" was employed. This checklist serves as a tool to evaluate the quality and reporting standards of survey research reports [36]. To evaluate the cluster randomized controlled trial study, the study conducted by Richardson et al. was utilized as a reference for assessment purposes. This particular study likely provided relevant insights and criteria for evaluating the cluster randomized controlled trial [37]. Each article was scored based on the final agreement of two evaluators. In cases where the two evaluators did not agree, a third person (AA.S) with more knowledge and experience in the field was consulted for an opinion.

Data extraction

For data extraction, three separate data collection forms were designed using Word 2016 software. These forms included a general characteristics form for article information, an intervention information and results form, and a form capturing details of the interventions. During the testing phase, these forms were used to collect data from three articles, and any deficiencies or issues in the initial forms were resolved. The actual data collection was then carried out by two individuals independently using the refined forms.

The information recorded in the article forms encompassed author name, publication year, country of residence, study setting, study type, participants, and their numbers. In the intervention forms, information included the author's name, publication year, a brief description of the intervention, type of intervention, application of electronic techniques/technology (e.g., email, internet, designed programs, games, software), duration of participant follow-up, number of intervention repetitions, outcomes examined in the study, the statistical significance of each outcome (yes/no), and overall effectiveness of the intervention (classified as completely effective, partially effective, or ineffective—with ambiguous cases determined through consultation with the research team members).

Data analysis methods

The extracted data were analyzed manually, and descriptive statistics such as percentages, frequencies, averages, and other relevant measures were utilized to report the findings.

In this study, decisions were made for each outcome based on the reported results (a p-value less than 0.05% was considered effective). The overall effectiveness of the study was determined based on the number of reported effective outcomes. If all outcomes were effective, the study was classified as effective. If some outcomes were effective, the study was classified as partially effective. If none of the outcomes were effective, the study was classified as ineffective.

Due to the huge diversity in the reporting format of results and the nature of data reporting in included studies, conducting the meta-analysis was not viable.

Results

Out of the initial pool of 3727 articles and reports, 360 duplicates were identified and removed. Following this, a title review was conducted, leading to the exclusion of 2588 articles. Further screening of the study abstracts resulted in the removal of an additional 349 articles. Subsequently, a full-text review was performed, leading to the exclusion of 19 studies. Finally, after the thorough

screening process, 21 articles met the inclusion criteria and were included in the study [38–58] (Fig. 1).

In 21 studies, a total of 2664 older people individuals participated in these studies (IG[1] and CG[2]), with 882 being male and 1782 being female, whose average age was 71.13 years. Most of the studies (15 studies) have been evaluated in the form of questionnaires and direct observation of indicators after the interventions, and a small number (6 studies) of the studies were only through questionnaires (Table 1) (Appendix 2 - data extraction forms included detailed data from included studies).

Studies countries

Most of the studies (18 studies) were conducted in high-income countries (HICs), specifically in the USA. Only three studies were conducted in low and middle-income countries (LMICs). Out of the 18 articles conducted in HICs, eight of them showed the full effectiveness of the interventions, meaning that all the intervention indicators were effective. However, for the three articles conducted in LMICs, the results indicated effectiveness only for several intervention indicators, suggesting that not all aspects of the interventions were successful.

Study design

Out of the 21 reviewed studies, most of the studies applied the RCT (Randomized Control Trial) methodology (nine studies) (Fig. 2).

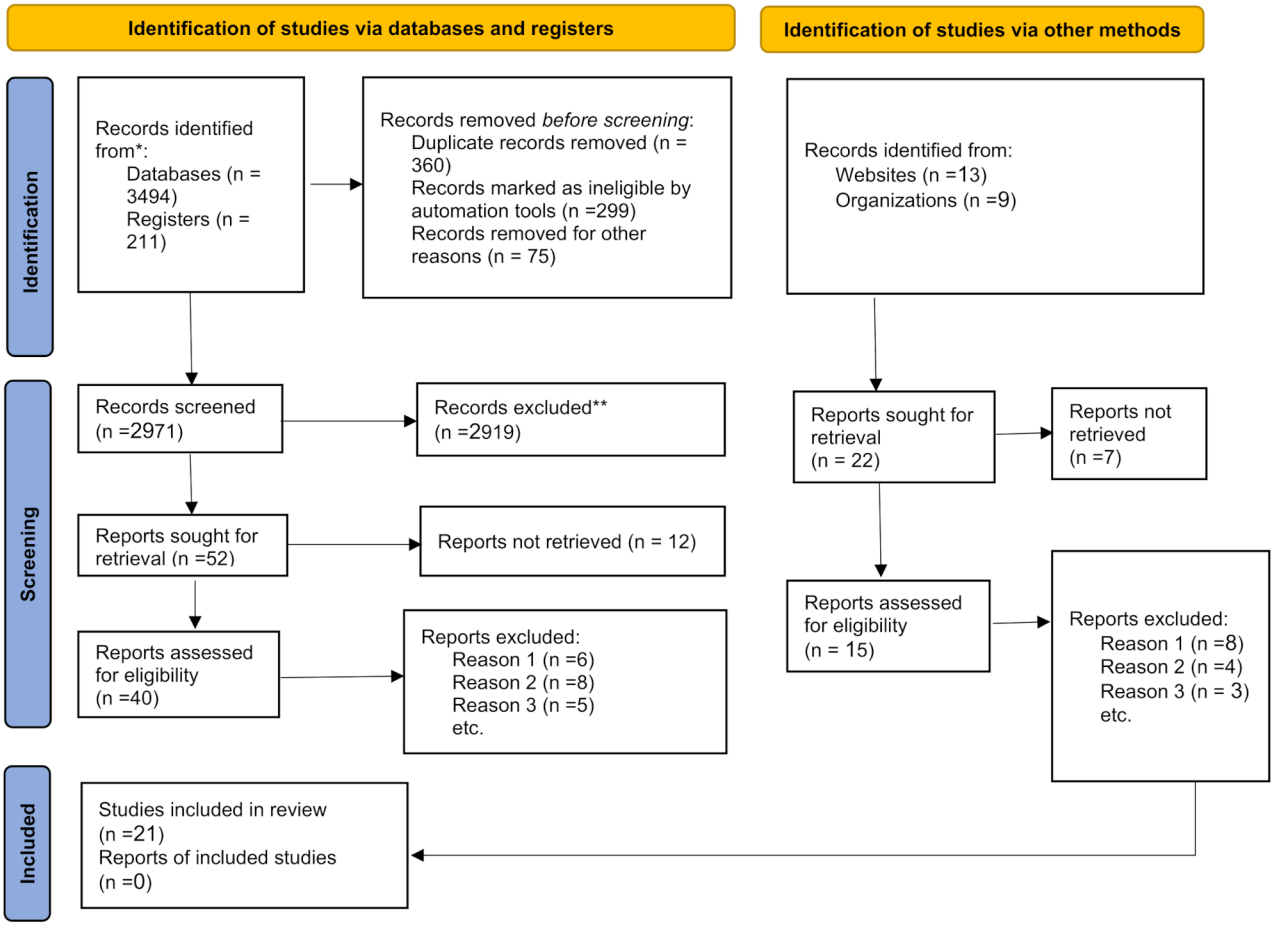

Fig. 1 PRISMA 2020 flow diagram for new systematic reviews which included searches of databases, registers and other sources
*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers)
**If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools. From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. https://doi.org/10.1136/bmj.n71. For more information, visit: http://www.prisma-statement.org/

[1] Intervention Group.

[2] Control Group.

Table 1 Summary of the characteristics of the articles that reported the results of interventions to improve the health literacy of the older people

Variables	Variable level	*N* (%)	Variables	Variable level	*N* (%)
Countries Conducting Studies (21)	USA	10(47)	**Mean age (21)**	60 to 65	1(4)
	Iran	3(14)		65 to 70	5(23)
	Taiwan	2(9)		70 to 75	6(28)
	Japan	1(4)		75 to 80	3(14)
	Singapore	1(4)		No mention to base age	6(28)
	Australia	1(4)	**The year of the study (21)**	2008	2(9)
	Sweden	1(4)		2009	1(4)
	Canada	1(4)		2011	1(4)
	Spain	1(4)		2012	1(4)
Study design (21)	RCT*	9(42)		2013	1(4)
	Pre-Post	5(23)		2016	1(4)
	Quasi Experimental Study	3(14)		2017	1(4)
	Experimental Study	2(9)		2019	5(23)
	Survey	1(4)		2020	1(4)
	CRT**	1(4)		2021	5(23)
	*RCT: Randomized Control Trial **CRT: Cluster Randomized Trial			2022	2(9)

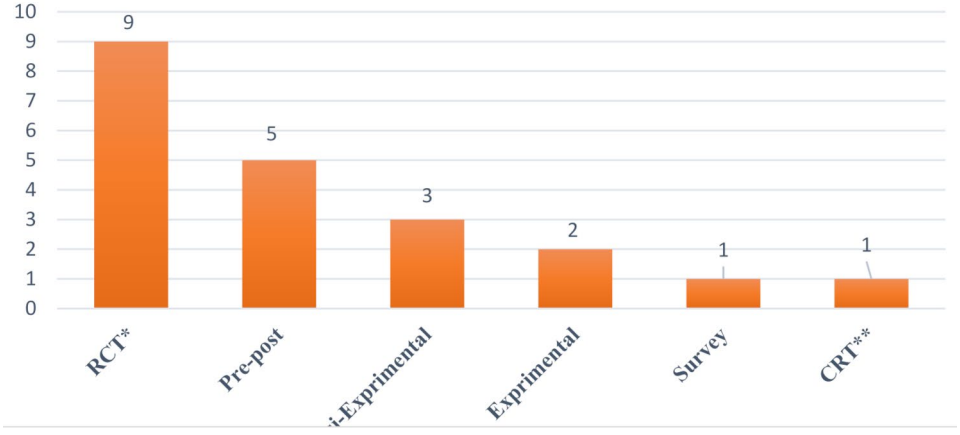

Fig. 2 Design of studies aimed at enhancing the health literacy of the Older adults
**CRT: Cluster Randomized Trial

Setting

Studies setting

The largest number of studies (11 studies) were conducted in nursing homes, followed by seven studies at the community level (Community-based interventions refer to programs and initiatives that aim to improve the health and well-being of specific population groups within a defined local community. These interventions are often multicomponent, meaning that they employ multiple strategies and tactics to achieve their goals. They may include individual-level strategies such as education and counseling, as well as environmental-level strategies such as policy changes and community mobilization. These interventions often involve collaboration between multiple stakeholders, including community members, government agencies, and non-profit organizations. By working together, these groups can address the complex social, economic, and environmental factors that contribute to health and well-being in their community [59]). There were also two studies conducted as a combination of nursing home and community settings. there was one study conducted at the Georgia Technology Center.

Out of the 11 studies conducted in nursing homes, the results of four studies showed the full effectiveness of the interventions, meaning that all indicators used to measure effectiveness were positive. For the seven studies conducted at the community level, the results of five studies demonstrated the full effectiveness of the interventions. Regarding the two studies conducted in both nursing home and community settings, the results of one study indicated the full effectiveness of the interventions. Additionally, there was one study conducted at the Georgia Technology Center, which also confirmed the effectiveness of the interventions [42]. Based on this review

of studies focused on improving HL among older people, it can be concluded that out of the 21 studies reviewed, 11 studies expressed the full effectiveness of the interventions. In eight studies, some indicators showed effectiveness while others did not, indicating mixed results. Furthermore, two studies did not affect the desired outcomes.

Type of interventions

Interventions were divided into two main categories: lifestyle modification and educational interventions.

Educational interventions

Out of the 13 studies focusing on educational interventions, nine studies demonstrated the full effectiveness of the interventions, indicating positive outcomes across all relevant indicators. Additionally, four studies showed partial effectiveness, suggesting that some indicators of the interventions were effective while others may not have been as successful. The key methods for providing educational interventions included holding seminars, preparing and distributing educational DVDs, broadcasting educational videos in facilities like nursing homes, using printed materials such as pamphlets and brochures, and offering face-to-face training.

The key topics identified in effective educational interventions include:

- Training to enhance physical health and fitness.
- Strategies to improve mental health.
- Development of self-care skills.
- Enhancement of oral and dental health.
- Emphasis on healthy nutrition.
- Increasing media and digital literacy.
- Awareness of reading drug labels before consumption.

Lifestyle modification interventions

In eight studies, lifestyle modification interventions were applied. Out of those, only one study reported the full effectiveness of the interventions, indicating positive outcomes across all relevant indicators. However, two studies indicated no effectiveness, suggesting that the interventions did not yield the desired results. On the other hand, five studies confirmed the effectiveness of some intervention indicators, meaning that certain aspects or measures of lifestyle modifications were successful.

The most significant lifestyle change interventions include tracking step count, engaging in moderate-to-vigorous physical activity, participating in local community events, and fostering connections with family and friends. Additional factors include visits to nurses, depressive symptoms, and drug utilization literacy. The effects of these interventions were assessed through observations, questionnaires, and laboratory tests. To evaluate the effectiveness of these lifestyle change interventions, key variables were measured. These included blood sugar levels, blood pressure, mental health status, physical changes, and shifts in social behavior.

One-dimensional or multi-dimensional studies

In 13 studies, interventions were conducted in a multi-dimensional manner (targeting multiple variables). Out of these, five studies reported that the interventions were completely effective, indicating positive outcomes across all relevant indicators. Additionally, six studies reported partial effectiveness, suggesting that some intervention indicators showed positive results while others did not. Furthermore, two studies reported no effectiveness, indicating that the interventions did not yield the desired outcomes. In eight studies, interventions focused on a specific variable to improve the HL of the older people. Out of these, five studies demonstrated the complete effectiveness of the interventions, indicating positive outcomes across all relevant indicators. Additionally, three studies reported partial effectiveness, suggesting that some intervention indicators showed positive results. One-dimensional interventions were more effective compared to multi-dimensional interventions.

The duration of the interventions

Based on these data, there appears to be a general trend in which the effectiveness of interventions increases with longer duration. In the studies conducted in eight weeks or less, 38.46%, in the period of nine weeks to 24 weeks, 43.33%, for the single study that was conducted between 24 weeks and 48 weeks, 85.71% of the indicators were effective Finally, in studies without reported duration, all six studies were fully effective.

Use of technology

Out of the 21 articles included, six studies utilized various technology methods for implementing interventions. These methods included sending emails, phone calls, CDs, DVDs, educational videos, websites, short messages, pamphlets, educational booklets, radio, newspapers, posters, and television commercials. Among these six studies that used technology methods, the results of the interventions were reported to be completely effective in five cases. Additionally, in one study, some indicators of effectiveness were observed. On the other hand, among the remaining 15 studies that did not use any kinds of technological methods, the results of the interventions were completely effective in five cases, while 10 studies showed the effectiveness of some indicators.

In a study by Hoe, D. F. and colleagues (2021), in the USA to test the effectiveness of theoretically driven role

model video stories in improving knowledge of palliative care among a diverse sample of older people. regression analysis showed that participants who believed that role models were real people predicted significantly higher changes in knowledge scores, controlling for all other variables in the model. On the other hand, participants who had prior knowledge or experience of palliative care had less change in knowledge scores after controlling for other variables in the model. Additionally, being nonwhite and widowed, as opposed to being married, were significant predictors of lower changes in knowledge scores [43]. In the study of Mirzaei and colleagues (2016) in Iran to determine the effectiveness of the educational intervention on knowledge, attitude, and nutritional behaviors of the older people with adequate health literacy and inadequate health literacy. the intervention group with insufficient health literacy, only the mean score of awareness showed a significant increase after the intervention, and it had no effect on attitude and behavior [47]. In another study conducted by Xie, B. and colleagues (2011) to examine the effects of a theory-based e-health literacy intervention for older people in the USA. When controlling for baseline differences, no significant main effect of the learning method was found on computer/Web knowledge, skills, or eHealth literacy efficacy. Thus, collaborative learning did not differ from individualistic learning in affecting the learning outcomes. No significant interaction effect of learning method and time of measurement was found. Group composition based on gender, familiarity with peers, or prior computer experience had no significant main or interaction effect on the learning outcomes. Regardless of the specific learning method used, participants had overwhelmingly positive attitudes toward the intervention and reported positive changes in participation in their own health care as a result of the intervention [58]. Smith, California and colleagues (2019) in Australia, during a study on the effectiveness of a CM educational intervention delivered using a web or DVD format with a booklet to increase decision-making self-efficacy and health literacy of the older people, they found that decision self-efficacy improved for participants, but did not differ between groups. Decision self-efficacy and health literacy outcomes were not influenced by the delivery of education using a website, DVD or booklet. Participants found the resources useful, and rated the content as good or excellent. CM Web or DVD and booklet resources have the potential for wider application [51].

Total indicators

In 21 articles reviewed, a total of 133 indicators were measured and reported, 67 were found to be statistically insignificant, meaning that there was no significant relationship or effect observed on those particular indicators. On the other hand, 66 indicators were reported as significant, indicating that there was a statistically significant relationship or effect associated with those specific indicators (Table 2).

The results of reporting quality assessment

The results of the evaluation of the quality of the articles showed that the average scores of the reporting quality

Table 2 The effectiveness of interventions aimed to increase the health literacy of the older people based on the variables examined in the study

Variable	Variable level	Number of studies	Index number	Number of effective indicators	Effectiveness percentage
Type of intervention	Educational	13	49	34	69.38
	Lifestyle modification	8	83	32	38.55
Country	High income countries	18	103	52	50.48
	Middle and low income countries	3	30	14	46.66
Place/field of study	Community	7	36	21	58.33
	Nursing home	11	73	34	46.57
	A combination of community and nursing home	2	20	7	35
	in the Georgia Tech Aware Home	1	4		
Use of technology	YES	6	23	18	78.26
	NO	15	110	48	43.63
One-dimensional or multi-dimensional studies	Hybrid	13	101	45	44.55
	Exclusive	8	32	21	65.62
Duration of the study	$8 \geq T$ weeks	8	52	20	38.46
	$9 \leq T \leq 24$	6	60	26	43.33
	$24 < T \leq 48$	1	7	6	85.71
	No report	6	14	14	100

of randomized clinical trial studies are 10.81 out of 13, quasi-experimental studies are 8.25 out of nine, survey studies are 26 out of 33, and cluster randomized controlled trial studies are 20 out of 26 (Appendix 3 - reporting quality assessment results).

Discussion

21 studies were included in this study. Most of the studies had full effectiveness in all the reported indicators. The review of studies showed that studies should be community-oriented, one-dimensional, in a suitable period of time (long follow-up) and using technology.

Based on these findings, it can be concluded that the interventions conducted in HICs were more effective compared to those conducted in LMICs. Baker et al.'s study in 2023 confirms this claim [60]. This discrepancy in effectiveness could be attributed to various factors such as differences in resources, infrastructure, healthcare systems, socio-economic conditions, and cultural contexts between high-income and middle/low-income countries. It's important to note that this conclusion is based on the limited information provided and may not capture the full picture of the effectiveness of interventions across different income countries. Further research and analysis would be necessary to gain a more comprehensive understanding of the topic. While it is true that many interventions have been primarily carried out in HICs, and their effectiveness tends to be higher, it is important to consider various factors contributing to this disparity. Research Bias: There may be a publication bias that favors studies conducted in HICs due to the predominance of prestigious research institutions and journals in those regions. This can lead to the underrepresentation or exclusion of studies from LMICs, which may contribute to the apparent difference in effectiveness. Resource Limitations: LMICs often face financial limitations and resource constraints, making it challenging to conduct large-scale intervention studies. Limited funding for research and healthcare infrastructure can hinder the ability to execute robust studies and generate sufficient data. Language Barriers: Language limitations can also play a role. Studies conducted in LMICs may be published in local or regional journals, which are not widely accessible or indexed in international databases. Consequently, they could be overlooked during literature searches and systematic reviews, leading to a skewed representation of the effectiveness of interventions. Socioeconomic Factors: HICs generally have better overall socioeconomic conditions, including access to healthcare, education, and social support systems. These factors can influence the health outcomes of older people, potentially impacting the effectiveness of interventions. Lower-income countries often face additional challenges related to poverty, malnutrition, limited healthcare infrastructure, and inadequate social welfare programs. It is important to acknowledge that these factors contribute to the observed differences in intervention effectiveness. Efforts should be made to address these disparities by promoting research collaborations between countries, supporting capacity-building initiatives in LMICs, and ensuring that findings from diverse contexts are adequately represented in global research [61] and HICs often have more resources and infrastructure to allocate towards healthcare, including interventions targeting the older people population. These countries may prioritize and invest in initiatives aimed at improving HL among older people due to factors such as the aging Population: HICs, as well as some middle-income countries, are experiencing significant growth in their older people populations. This demographic shift creates a greater demand for interventions and services tailored to the specific needs of older people, including HL programs. Healthcare Prioritization: Countries with stronger economies generally allocate more resources to healthcare and social welfare programs. They may recognize the importance of addressing the health needs of older people and place a higher priority on designing and implementing interventions that promote HL. Research and Innovation: HICs often have advanced research institutions, which can lead to the development of innovative approaches to improve HL in the older people population. These countries may invest more in research and development, leading to a greater understanding of effective interventions and strategies. However, it is worth noting that some LMICs are also recognizing the growing needs of their aging populations and taking steps to address them. International organizations, non-governmental organizations (NGOs), and global health initiatives are working to bridge the gap by supporting capacity-building efforts, sharing best practices, and facilitating collaborations between different countries. Efforts are being made to develop context-specific interventions that take into account the unique socioeconomic and cultural aspects of LMICs. These interventions aim to improve HL and overall well-being among older people, even with limited resources. By promoting knowledge exchange and collaborative partnerships, it is possible to enhance the effectiveness and accessibility of interventions in various settings, regardless of a country's income level [62]. In these countries, the level of HL and general literacy among the population is generally low [63] and Given that governments possess the capacity to offer extensive support, it is recommended that HICs, the World Health Organization, NGOs, and related organizations extend their assistance to these countries, aiming to enhance the HL of their populations.

Many studies on older people populations have indeed been conducted in nursing homes. There are several

reasons for this trend. Nursing homes provide easier access to a concentrated group of older people individuals, making follow-up and data collection more convenient for researchers. Moreover, residents of nursing homes may be more willing to participate in studies due to having more time available and potentially feeling a greater sense of community. However, it's important to note that the effectiveness of studies conducted in the community does not necessarily indicate higher HL among older people individuals living outside nursing homes. It could be attributed to various factors. Older people individuals living in the community often have more diverse backgrounds, lifestyles, and access to resources. This diversity can enhance the generalizability of research findings and allow for a broader representation of older people. Additionally, conducting studies in the community allows researchers to examine a wider range of health conditions, social interactions, and environmental influences that may impact the participants' well-being [64]. This broader scope can contribute to the perceived effectiveness of studies conducted at the community level. Overall, while it's true that studies conducted in nursing homes have their advantages, research in the community setting offers its unique benefits and insights into the health and well-being of older people. Both approaches play a crucial role in advancing our understanding of aging-related issues and improving healthcare outcomes for the older people population [65]. Kiik et al.'s study shows that the older people living in the community have a higher quality of life in four areas (physical health, mental health, social relations, environment) than residents of nursing homes or social welfare institutions [66]. The older people living in the community receive more support from their families compared to those residing in nursing homes [67] and higher economic and welfare levels [68], It is expected that health education will be more effective for older people individuals living in the community, as those residing in nursing homes typically have lower HL and income levels [69]and have more mental and emotional problems [70]. Due to old age, physical and cognitive diseases, and limited communication with society and family, older people living in nursing homes may have less desire and ability to participate in health literacy promotion interventions compared to other older people. Also, considering that mental and emotional problems may affect the non-participation of the in the older people interventions [71], it is suggested that the interventions be implemented along with happy programs such as music, pantomime, theater, etc. This could potentially explain the lower effectiveness of interventions in nursing homes. It is noteworthy that many highly effective studies have been conducted at the community level, and it is worth considering that LMICs typically have fewer nursing homes compared to HICs [72], It is suggested that these countries consider conducting more community-level studies to address. LMICs can use national media and national television to teach health literacy to the older people and ask families to follow up if the older people are illiterate. Also, by adding the health literacy section to primary health care, upgrade it. the potential research gaps Such studies can provide valuable insights into the effectiveness of interventions among older people individuals living in the community.

Based on the study results, it was found that educational interventions outnumber and outperform lifestyle modification interventions in terms of both quantity and effectiveness. This finding suggests that when the goal is to improve the HL of older people, education emerges as the most logical and fundamental element for enhancing HL. Additionally, implementing educational interventions is generally easier than implementing lifestyle modification interventions, which could explain their higher prevalence [73]. The implementation, follow-up, and assessment of effectiveness in lifestyle modification interventions appear to be more challenging compared to educational interventions. This may be due to the complex nature of lifestyle changes and the difficulties associated with monitoring and measuring behavior modifications. Educational interventions, on the other hand, primarily focus on increasing awareness and knowledge rather than directly altering behaviors. While they can effectively enhance HL, their impact on behavior change might be limited [74] and the ultimate goal of promoting HL is to improve lifestyle and enhance its quality. Therefore, it is suggested that more studies should prioritize behavior modification interventions within the living environment. These interventions aim to maintain the independence of older people while requiring minimal presence of researchers [75]. One approach could involve designing online platforms that provide educational resources and support for behavior change. Additionally, periodic visits from experts and specialists can be incorporated into the intervention design and implementation to ensure personalized guidance and assistance. It is suggested to use financial and non-financial incentives in educational packages to improve the lifestyle of the older people, for example, to increase the mobility of the older people, they can be given free bicycles or the use of sports facilities is free for them.

The majority of studies conducted on older people populations have been of short duration, with limited research focusing on longer-term interventions. To effectively improve the HL of older people who may have reduced learning capacity, it is crucial to conduct studies with extended durations. Long-term studies provide an opportunity to assess the sustained impact of interventions and better understand the long-lasting effects on HL outcomes. By extending the duration of studies,

researchers can gain insights into the effectiveness and durability of interventions aimed at enhancing HL among older individuals [76]. To better observe and measure the effects of interventions and consider the documented higher effectiveness of studies with longer implementation and follow-up durations, it is recommended to conduct interventions over an extended period.

Typically, studies involving older people have been conducted without utilizing technology due to their lower proficiency in working with digital tools. However, it is worth noting that studies incorporating technology (smartphones, tablets, computers) have shown greater effectiveness [77, 78] In light of the increasing usage of smartphones, tablets, computers, and other digital devices by the older people, it is recommended to incorporate new technologies in the future studies as a means to enhance the HL of older people. Animations, radio and television can be used in interventions for older people who have lower literacy.

Strengths and limitations

Although in this study, the researchers tried to provide comprehensive and practical information for the readers, health service providers and decision makers by comprehensively searching, extracting, analyzing and interpreting information on interventions to improve the HL of the older people, there were several limitations in conducting the present study. One of the primary limitations of the present study is its limited generalizability, primarily arising from the restriction of conducting studies exclusively in HICs. Consequently, the applicability of the findings to LMICs may be limited. Additionally, due to the variability and constraints associated with indicators of HL among older people, as well as inconsistencies in their reporting across articles, meta-analysis could not be performed for most indicators in this study. Moreover, the search for relevant studies was limited to those published in Farsi and English, potentially excluding studies published in other languages.

Conclusion

Based on the results of the present study, it can be concluded that interventions targeting HL among older people have shown effectiveness. Therefore, it is recommended to prioritize these issues in future interventions. It is important to design and implement community-based interventions that encompass a one-dimensional approach, incorporating the use of technology and considering the duration of the intervention. Given the rising older people population in LMICs, coupled with the anticipated low HL of the older people in these nations, and the insufficient interventions in place, it is advisable to seek support from international organizations like the World Health Organization to effectively design and implement interventions in these regions. Although in this study, the conditions and specifications of more effective interventions were reported. It is imperative for decision makers and service providers in the field of aging to conscientiously consider not only these factors, but also their local conditions such as the socioeconomic status of older people and the healthcare service delivery system when formulating and implementing interventions.

Abbreviations

HL	Health Literacy
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
EAGLE	The Exploitation of Gray Literature
HMIC	The Healthcare Management Information Consortium
CONSORT	The Consolidated Standards of Reporting Trials
HICs	High-income countries
LMICs	Low and middle-income countries
RCT	Randomized Control Trial
CRT	Cluster Randomized Trial
NGOs	Non-governmental organizations

Supplementary Information

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Supplementary Material 1

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Author contributions

M.S. and S.A. gave the idea of this study and searched the databases in cooperation with each other and analyzed them after screening and extracting the data and wrote the initial manuscript. H.M. and A.SH. contributed to the screening and analysis of this study. S. M. and R.B. participated in data extraction and writing the initial manuscript.

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Data availability

All data generated or analysed during this study are included in this published article [and its supplementary information files].

Declarations

Ethics approval and consent to participate

The present study has been evaluated by the Research Vice-Chancellor of Tabriz University of Medical Sciences with the code of ethics IR.TBZMED.REC.1401.681.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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