Abstract

Older adults make up the fastest growing age group in North America. This has demanded increased attention in supporting the health and well-being of this population and, in particular, the role of health information in promoting the health and well-being of older adults. Increased availability and accessibility of information as well as a greater emphasis on self-management and care have raised concern about an individual’s health literacy skills. The purpose of this study is to conduct a systematic literature review using explicit systematic literature review methodology. This includes a detailed online search process of recent publications on programs that focus on health literacy in the older adult population using the Rychetnik et al. guiding questions and the Population Intervention Comparison Outcome framework. The search yielded nine articles describing functional \((n = 4)\) and interactive \((n = 5)\) health literacy programs. Overall, the selected articles demonstrated positive outcomes in supporting the health literacy skills of older adults. However, there are limitations in study designs and evaluation measures and outcomes of the programs remain unknown in demonstrating long-term impact in supporting health literacy skills. Further high quality studies with clear and strong research methodology are needed to develop and evaluate evidence-based interactive health literacy programs targeted specifically to older adults.

Introduction

The older adult population will soon outnumber children for the first time ever. In North America, older adults make up the fastest growing age group and this trend is expected to continue for the next several decades [1, 2]. More than ever, older adults are looking to take control of their health [3, 4] and rely less on health care providers as their only source of health information [5]. Older adults are considered more ‘health conscious’ and are proactive about accessing preventative health information [4]. This shift in part is due to greater availability and accessibility of information, and in particular, health-related information on the Internet [6]. It follows then, that the impact of online health information on health behaviors is growing significantly [4, 7], especially for those living with one or more chronic illness [8].

Increased availability and accessibility of information and a greater emphasis on self-management and care [9] have raised concern about the health literacy skills of individuals [10] and now more specifically, eHealth literacy skills [11]. These are the skills that specifically pertain to online health information. Health literacy is defined as an individual’s capacity to access, understand and use basic health information and services in order to make appropriate health decisions [12].

Over half of North Americans do not have the skills to manage their health adequately [13, 14]. There are many subsets of the population that are at greater risk for lower levels of health literacy,
which includes older adults [15]. Adults over the age of 65 years have the lowest levels of health literacy compared with younger age groups [14] with a rapid decline in health literacy skills starting after 55 years of age [13]. A recent systematic review demonstrated the characteristics of accelerated aging were largely associated with inadequate health literacy skills [16].

In particular, health literacy has been recognized as a strategy for reducing health disparities among vulnerable groups, because of its potential to enhance control over one’s health [11, 17–20]. Therefore, the role for health literacy in older adults has especially garnered recent attention [20–24]. With this rapid population increase, and the surge in online health information, efforts targeted to older adults and health literacy are both relevant and crucial to supporting overall health and well-being of this population [21, 24, 25].

Health literacy is a relatively new concept, with much of the research accumulated over the past 10 years. The Canadian Council for Learning (CCL), a leader in promoting health literacy in Canada, identifies a framework for understanding the theoretical underpinnings of health literacy [13]. It is divided into five categories: health promotion (i.e. actions taken to increase control over one’s health), health protection (i.e. actions taken to preserve and protect health), disease prevention (i.e. actions taken to prevent the onset of illness or disease), health care (i.e. actions taken to seek care) and navigation (i.e. actions taken to utilize programs, services and care). This framework identifies the variety of health activities and behaviors that impact individuals’ health-related decisions and ultimately their health outcomes. For example, self-motivated learning about the importance of disease screening, promoted by a television or a newspaper advertisement, is an example of a health literacy activity in the disease prevention category.

Paasche-Orlow and Wolf offer a conceptual model linking the causal pathways between health literacy and health outcomes [26]. Similar to the CCL’s framework, this framework emphasizes the role for self-care, provider-patient interaction and access and utilization of the health care system. At the same time, a distinction is made that health literacy health outcomes not only occur at the individual level but also includes the contextual level of the enabling or disabling environment impacting overall health outcomes. These frameworks emphasize the many factors contributing to an individual’s health literacy status and ultimately their health outcomes, including various biological and social determinants.

Recently, Cutili [24] completed an integrative review of the health literature focusing on health literacy in the aging population. Several foci for future areas of research were identified, including an examination of the effectiveness of strategies to support the healthy literacy skills of this population. While there is growing interest with health literacy in the aging population, to our knowledge, there have been no systematic reviews of the research literature on health literacy programming targeted specifically to the older adult population. Schaefer [19] completed a review of health literacy programs targeting the population as a whole. Interventions that included persons over the age of 50 years were selected, however either the interventions did not target older adults specifically or interventions focused on developing health literacy skills of the health practitioner versus the patient or individual, which is not a focus of this present review.

For these reasons, the purpose of this study was to conduct a systematic literature review of recent educational programs that focus on health literacy in the older adult population.

The following research questions guided this systematic literature review:

(i) What health literacy programs targeted to older adults exist to support the access, understanding and use of health information?

(ii) What are the nature and outcomes of these existing health literacy programs targeted to older adults?
Methods

Literature search strategy
An online database search was completed. The primary online search used the following indexes: PsychInfo, Cumulative Index to Nursing and Allied Health (CINAHL), Education Resources Information Centre (ERIC), Proquest Research Library, Abstracts in Social Gerontology, Digital Dissertations and Communication & Mass Media Index. All databases searched from January 2000 to Week 1 of March 2011. Key search words included a combination of health literacy; older adult* or senior* or aged; and intervention or tool or education or program. A secondary search using the same keywords in Google, Google Scholar and US National Library of Medicine search engines was completed. Reference lists from selected articles were scanned to identify and assess further articles for selection. Articles selected from this yield were entered in the US National Library of Medicine’s Related Citation feature for review of any further relevant articles for selection. A combination of all these search methods comprised the search yield.

Study selection criteria
To be selected for the current review, articles had to meet the following inclusion criteria: (i) peer-reviewed journal articles, conference proceedings, dissertations, or practice guidelines of health literacy tools, interventions and/or programs; (ii) published in English between January 2000 and March 2011. The approximate 10-year time frame for study inclusion was selected given the newness of the research area; (iii) programs targeted towards the older adult population (ages 50 years and older). The age range for older adult, normally characterized as 65 years and older was expanded given ongoing increased recognition of the importance of health promotion and disease prevention in ages younger than 65 years [27]; and (iv) the program included health literacy as a goal, reflected in one or more of the following three key components of health literacy: (a) access, (b) understand and (c) use health information. Given the relative novelty of this concept, articles that did not explicitly state an outcome of health literacy were reviewed for eligibility by both authors to determine if they met one or more of the identified key components of healthy literacy.

Articles were then excluded if (i) programs targeted health professionals to develop health information resources (e.g. fact sheets) based on health literacy principles and (ii) if the articles were not published in English. This exclusion criteria was identified given the purpose of this review is to identify programs grounded in health promotion principles that support the older adult population directly through capacity building and skill development [28]; (iii) the program’s primary focus was to improve health literacy with an emphasis on computer literacy alone. While computer literacy is an important aspect of e-health literacy [11], this type of literacy was not the focus of this review, which explores the skills of older adults who are already comfortable with using a computer; and (iv) the focus was on health literacy assessment only without any support for health literacy skill development.

Data extraction
After being assessed for inclusion and exclusion criteria, articles that met these selection criteria were then critically appraised based on the (i) methodologic quality and (ii) relevance to the research questions.

(iii) Given the infancy of the research area, we were not limited to articles of a particular standard of methodologic quality. Articles were reviewed against the following quality criteria: non-experimental, quasi-experimental and experimental design; geographically relevant (e.g. North America, Europe, UK and Australia); assessment of health literacy skills; and they had presence of evaluation of the intervention.

(iv) Rychetnik et al [29] identify three questions for the purpose of critically appraising research specific to public health practice: (a) Is the research valid, sound and applicable
to my situation?; (b) What outcomes can I expect if I implement this research?; and (iii) Will my target population be able to use this research? These questions guided the selection of articles reviewed in combination with the PICO methodological quality assessment tool (Population Intervention Comparison Outcome) [30]. PICO supports an evidence-based approach in finding an answer to the identified research questions. In the case for this review, the approach is applied with the older adult population and impact of health literacy programs compared with no training on promoting overall health outcomes.

Next, if selected, the following data were extracted about the research design (including evaluation and health literacy assessment tool if present), intervention characteristics (including goal and targeted literacy level [i.e. functional, interactive, critical], location and setting; program components, target population and health issue of interest; delivery and outcome measures), and key findings the health literacy program. Articles were categorized to represent one of the following three levels of health literacy as described by Nutbeam [31]:

(v) **Functional health literacy**, which is limited to the communication of information only. This includes broad communication of health information through existing channels and available media.

(vi) **Interactive health literacy** with the purpose of developing personal skills. This includes the tailoring of health information towards a specific need and a more comprehensive delivery of information combined with a variety of communication channels and delivered in a supportive community setting. Interactive health literacy is grounded in health promotion theory, as personal skill development enables individuals to gain control over their existing health issue while developing skills for preventative health [12].

(vii) **Critical health literacy**, which draws on the first two levels of health literacy while supporting greater community action and advocacy to enable community development. The community-social benefit is greater than the individual benefits.

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### Results

The sum total of all articles selected through the online database and secondary searching resulted in the search yield. The search strategy is diagrammed in Fig. 1. Of the 95 articles screened in the online database search, six articles were selected [32–37]. From the secondary online search, three additional articles [38–40] were selected, thus a total of nine articles were selected in this review. Four articles [32, 33, 35, 36] were classified as functional health literacy and the remaining were classified as interactive health literacy [35, 37–40]. No articles met the critical health literacy classification. Data extracted are represented in Table I. This table provides an in-depth overview as to the nature and outcomes of each of the health literacy interventions. In particular, the activities of each intervention are detailed to understand how each program was administered and to what purpose it served. The following highlights the most pertinent results as it pertains to the identified research questions.

### Research design and objectives

Selected articles were all non-experimental in design, using a pre- and post-test single group design. Five articles included an intervention follow-up [32, 36–38, 40]. Two articles completed the follow-up immediately post-intervention [32, 40] and two articles completed the follow up after 3 weeks [36] and 6 months [37]. One article had two follow-ups, at 5 weeks and 1 year post intervention [38]. The participant sample sizes for all articles were small, although appropriate for the respective design and intended purpose of the studies in making generalizations to the targeted populations only.
The objectives of functional health literacy programs focused on improving literacy skills to locate relevant health information. Interactive health literacy program activities placed a greater focus on understanding health information by promoting personal skill development. More specifically, this included retrieving and evaluating health information for its relevance and quality to support health-related decision-making.

**Program characteristics**

Programs were located in North America, with the majority from the United States and one program residing in Canada [34]. Programs were delivered primarily in local community settings, including public libraries [32, 34, 36, 38, 40] and community centers [32, 33, 35, 36, 38, 39]. Content was focused on accessing, using and understanding health information. While some programs focused on specific diseases like diabetes, stroke and cancer, others more broadly focused on overall health. Librarians [32–34, 36, 40], researchers [34, 36], program trainers [38] and health professionals [32, 33, 35] or a combination of these, were responsible for delivering the course or workshop material.
<table>
<thead>
<tr>
<th>Authors</th>
<th>Research design, activities</th>
<th>Tool, program and/or intervention characteristics</th>
<th>Author key findings</th>
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<tbody>
<tr>
<td><strong>Functional health literacy</strong></td>
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<tr>
<td>Broering et al., 2006 [32]</td>
<td>Design: non-experimental, single group post-test design ($N=3500$ participating in speech presentations, demonstrations and exhibits; 350 people attending class sessions)</td>
<td>Goal: enable local senior residents to improve their health and health care by accessing authoritative information using the latest technologies</td>
<td>Process of developing functional health literacy tool is promising in promoting health literacy in seniors</td>
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<td></td>
<td>Activities: provide computer training workshops on electronic information resources; provide consumer health information support for senior citizens; teach access to full-text databases and extend document delivery or loan document services to project partners</td>
<td>Type: functional Health Literacy</td>
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<td></td>
<td></td>
<td>Location (setting): San Diego, USA (local community settings)</td>
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<td>Components: single workshops (duration not described)</td>
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<td></td>
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<td>Target population (focus): seniors aged &gt;65 years (alternative health therapies)</td>
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<td></td>
<td></td>
<td>Delivery: librarian; health professionals</td>
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<td></td>
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<td>Outcome measures: participant Internet utilization to access relevant health information; participant satisfaction</td>
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<tr>
<td>Gross et al., 2007 [33]</td>
<td>Design: non-experimental, single group pre- and post-test design ($N=25$ sites)</td>
<td>Goal: educational program to meet information needs, improve seniors’ access to trusted stroke information and enhance health literacy</td>
<td>Improved knowledge on post-test scores over pre-test scores</td>
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<td></td>
<td>Activities: finding trusted stroke information on the Internet</td>
<td>Type: functional health literacy</td>
<td>Notable improvements occurring in the areas related to knowledge of Internet resources.</td>
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<td></td>
<td></td>
<td>Location (setting): North-Eastern Pennsylvania, USA (Senior centers and public libraries)</td>
<td>Participants gained knowledge on stroke information</td>
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<td></td>
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<td>Components: one hour workshop plus online resources</td>
<td>Provided easy-to-understand stroke information to community of seniors</td>
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<td></td>
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<td>Target audience (focus): seniors aged &gt;65 years (stroke)</td>
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<td></td>
<td></td>
<td>Delivery: librarians with focus on health literature</td>
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<tr>
<td></td>
<td></td>
<td>Outcome measures: content knowledge as it relates to health condition; Participant satisfaction</td>
<td></td>
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<tr>
<td>Nitri and Stewart, 2009 [35]</td>
<td>Design: non-experimental, single group pre- and post-test design ($N=20$)</td>
<td>Goal: to provide a transformative learning intervention on functional health literacy;</td>
<td>Positive influence of transformative learning intervention on functional health literacy and diabetes knowledge; Includes significant increase functional health literacy test for seniors (s-TOFHLA); Literacy assessment for</td>
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<tr>
<td></td>
<td>Activities: increase knowledge in how to search an improve self-management for diabetes</td>
<td>Type: functional health literacy</td>
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<td></td>
<td></td>
<td>Location (setting): Detroit, USA (senior community centers)</td>
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<tr>
<td>Valle et al., 2006 [36]</td>
<td>Design: non-experimental, single group pre- and post-test design (N=111) Activities: provide pictorial story magazines (photoneovelas) to increase awareness of Alzheimer’s disease for individuals and caregivers</td>
<td>Components: six-session interventions (duration not specified) Target audience (focus): older African Americans; aged &gt;55 years (diagnosed with diabetes) Delivery: health care professionals Outcome measures: participant Internet utilization to access relevant health information; pre- and post-assessment (s-TOFHLA, LAD and DKT)</td>
<td>Participants increased knowledge of Alzheimer’s disease Reported satisfaction with educational material</td>
</tr>
<tr>
<td>Interactive health literacy Campbell and Nolfi, 2005 [32]</td>
<td>Design: non-experimental, single group pre- and post-test design (N=42) Activities: using a computer and Web browser to access the Internet; locating health related information using search engines; evaluating health information found on the Internet; finding specific types of health information using various tools</td>
<td>Goal: encourage seniors to learn more about their health problems, evaluate their health care, and take a more active role in managing their health; Type: interactive health literacy Location: Pittsburgh and Allegheny County region, USA (Public libraries and senior community centres).</td>
<td>No robust before-after effects for most outcomes measured Older adults may be willing to use Internet as source for general health information, however when making decisions about health care, participants adhered to physician-centered model of care</td>
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<th>Authors</th>
<th>Research design, activities</th>
<th>Tool, program and/or intervention characteristics</th>
<th>Author key findings</th>
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<tr>
<td>Chiarella and Keefe, 2008</td>
<td>Design: Non-experimental, descriptive study design (N = n/a)</td>
<td>Target audience (focus): Seniors aged &gt;65 years (general health information)</td>
<td>Potential success for future of program, although program remains in development stages (thesis)</td>
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<td>Activities: Class instruction through Introduction to web resources, web addresses, contact information and criteria for evaluating web resources; Wiki with links to online resources targeted towards age demographic; Web page containing information pertinent to class, reference guide to be used at home reinforcing search strategies covered in class</td>
<td>Delivery: program trainers Outcome measures: health literacy scales (i.e. Multi-dimensional Health Locus of Control Scale; Krants Health Opinion Survey; Lau, Hartman and Ware Health Value Survey)</td>
<td></td>
</tr>
<tr>
<td>Hoffman-Goetz et al., 2006</td>
<td>Design: non-experimental, single group pre- and post-test design (N = 44)</td>
<td>Goal: To find ways to help seniors become more proactive in the management of the medical care; Type: Interactive Health Literacy Location (setting): Western New York, USA (Seniors centre) Components: three classes at 1.5 hours duration</td>
<td>Improved comfort in searching independently for web-based cancer information; searching difficulty decreased between pre and post-workshop; Self-rated understanding of Internet was also higher post workshop compared to pre-workshop Participants identified they would turn to Internet for cancer information in future</td>
</tr>
<tr>
<td></td>
<td>Activities: finding trusted cancer information on the Internet</td>
<td>Target audience (focus): senior citizens [ages not specified] (general health information)</td>
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<td></td>
<td></td>
<td>Delivery: not specified Outcome measures: participant Internet utilization to access relevant health information; health literacy skills; participant satisfaction; information retention</td>
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<tr>
<th>Authors</th>
<th>Research design, activities</th>
<th>Tool, program and/or intervention characteristics</th>
<th>Author key findings</th>
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| Schwartz et al., 2002 [40] | Design: non-experimental, single group pre- and post-test design \((N = 81)\)  
Activities: to provide background information on how to be safe on the Internet;  
To provide hands-on experience in finding quality health information on the Internet | content knowledge as it relates to health condition; health literacy skills  
Goal: To teach African-American and Hispanic senior citizens or their caregivers how to search the Internet to find quality, accurate and understandable health information; interactive health literacy  
Type: interactive health literacy  
Location (setting): Buffalo & Erie County, USA (Public libraries)  
Components: 14 sessions  
Target audience (focus): African American and Hispanic seniors >65 years (general health information)  
Delivery: librarians  
Outcome measures: participant satisfaction; participant Internet utilization to access relevant health information; health literacy skills | Participants were satisfied with program, trainer’s skills and quality of information received;  
Most believed they were capable of finding quality health information on the Internet; follow up was “in progress” at time of publication (note: authors did not retrieve further publications) |
| Susic, 2009 [37] | Design: non-experimental, single group pre- and post-test design \((N = 60)\)  
Activities: to support seniors in their navigation of the NIHSeniorHealth.gov website to support their health literacy | Goal: to support the seeking of quality health information on the Internet to support participant’s health literacy, the understanding of their health condition and make health-related decisions  
Type: interactive health literacy  
Location (setting): New Orleans, USA (East Bank Regional Library)  
Components: single workshop  
Target audience (focus): senior citizens [ages not specified] (general health information)  
Delivery: librarians  
Outcome measures: post skills assessment test (two question exercise to locate information about selected health condition) | Majority of participants could search health databases without help; training expected to increase level of participants’ health literacy and to increase understanding of health condition and make health-related decision; six-month follow-up results demonstrated participants were still using website to search health-related information |
Health literacy classification

Functional health literacy programs [32, 33, 35, 36] focused on computer literacy initially to support the skills of older adults in accessing relevant health information. This included participant’s ability to access information and use the information to support self-management of a health concern, for example, diabetes or stroke. Attaining content knowledge was also included as part of the intervention for participants to ‘gain information’ about overall health or specifically the chronic disease of interest. Articles were classified as functional health literacy if the emphasis was on improving content knowledge and locating relevant health information only.

Interactive health literacy programs [34, 36–40] extended beyond gaining health information with a focus on personal skill development to support the ‘capacity’ to access, understand and use basic health information, reflecting the core elements of health literacy [12]. Articles were classified as interactive health literacy if they emphasized the importance of personal skill development, improving personal capacity and emphasized positive behavioral outcomes such as improved motivation and self-confidence to support health-related decision-making.

Health literacy outcomes: functional and interactive

Outcomes were measured primarily through pre- and post-program evaluation and follow-up interviews administered by telephone or by mail. Functional health literacy programs evaluated a combination of the following variables: participants’ (i) ability to access relevant health information; (ii) content knowledge; (iii) participant satisfaction; and (iv) functional health literacy skills, in one case assessed using a standardized health literacy assessment tools, i.e. the short-Test of Functional Health Literacy in Adults (s-TOFHLA) as well as content-assessment tools for information pertaining to a specific disease, in this case, diabetes (Literacy Assessment for Diabetes (LAD) and Diabetes Knowledge Test (DKT)). Interactive health literacy programs similarly measured the same variables as functional health literacy programs, but also evaluated participants’ (v) interactive health literacy skills, such as improved comfort or confident in searching for health information, and self-perceived improvement in capacity of retrieving quality health information.

Functional health literacy

Broering et al. [32] demonstrated promising results in promoting the health literacy skills of seniors by supporting their ability to access relevant health information. Gross et al. [33] further evaluated the impact of their functional health literacy program by measuring improvements in knowledge as it relates to stroke information. Nitri and Stewart [35] measured changes in functional health literacy using standardized health literacy tool, in addition to health literacy assessment for disease specific information with the case of diabetes (i.e. LAD and DKT). In this intervention, the authors use these tools to describe participants improved knowledge on diabetes. While the primary focus was on functional health literacy, the authors also described outcomes of improved comfort in seeking out health information. This suggests improvements in interactive health literacy skills. However, given the purpose was to promote functional health literacy, this article was classified in this category. Valle et al. [36] attempted to use pictorial story magazines (photonovelas) to increase awareness of Alzheimer’s disease to support their health and well-being. Reported results, however, were limited to increased knowledge of the disease and educational material satisfaction.

Interactive health literacy

Overall, the selected articles demonstrated positive outcomes related to the health literacy skills of older adults. This included improved knowledge [36, 37], improved personal capacity to act independently in retrieving relevant health information and improved comfort and confidence in seeking out health information [34, 37, 40]. Of specific relevance given the growth of the information age, all five interactive
health literacy interventions focused on developing the user’s skill in retrieving and appraising online health information. Hoffman-Goetz et al. [34] and Susic [37] focused on improving interactive health literacy skills of older adults using the Internet to retrieve relevant cancer information. Participants identified self-perceived improvements in comfort in searching for web-based cancer information, with searching difficulty decreasing between pre and post-workshops. At 6 months follow-up, Susic noted participants continued to use the Internet to retrieve health information.

Schwartz et al. [40] similarly described the potential of their program to encourage older adult’s belief that they were capable of finding quality health information, although follow-up results were not located. Chiarella and Keefe [39] did not specify specific outcomes but highlighted potential success for the future of the program. At the same time, Campbell and Nofli [38] reported no difference in before or after effects of the stated outcome measures. In this case, while older adults were interested in learning more about their health via the Internet, they ultimately preferred to make decisions about their health with the support from their health care provider.

For those articles that included a follow-up as part of their intervention, the outcomes of the health literacy program remain unknown in demonstrating long-term impact in supporting health literacy skills [38, 39].

**Discussion**

A limited number of health literacy programs targeted specifically to the older adult population exist. The findings from this review support the existing body of literature that identifies a need to develop evidence-based interventions that meet the health literacy needs of specific populations [19, 26]. The lack of programs in this particular area of study may be due to the relative infancy of health literacy and an attempt to identify its causal pathway linking health outcomes [26]. Furthermore, more research is needed to identify the role for health literacy skills in potentially contributing towards the promotion of overall health and well-being among the aging [20, 41, 42]. Moreover, the lack of emphasis on health promotion strategies among the aging population may limit the number of interventions developed specifically looking at developing the skills of the aging population [43].

We were specifically interested in locating health literacy programming targeted towards older adults. An initial manual search by the research team retrieved several health literacy programs directed towards the training of health care professionals using the principles of health literacy. With this exclusion, our search yield was more limited. The importance of the healthcare provider in promoting health literacy in older adults has been proposed in the literature [21]. Specifically, the Paasche-Orlow and Wolf [26] framework emphasized the role of access and utilization of the health care system and the patient–provider interaction as imperative in promoting health literacy skills.

While we acknowledge this role in promoting health literacy, our focus is on promoting interactive health literacy programs in the older adult population specifically as identified in our research questions, which emphasize the development of skills within the individual to enable control over their respective health, and in this context, to help support successful aging. This includes a focus on coping skills, informed decision-making, and eliciting behavior changes with special emphasis on preventive behaviors [10, 44]. Given the complexity of factors impacting health literacy activities both at the individual and systems level, attention is needed at both levels to comprehensively and collaboratively meet the health needs of the aging population. Indeed, intervention efforts are more likely to be effective in the target population with acknowledgement of the interdependence of various factors impacting health literacy levels as it relates to overall health outcomes.

While the selected articles demonstrated positive outcomes of health literacy training in older adults, there are limitations in generalizing these results of the study given the study design and evaluation measures used. The results are demonstrated
within a pre- and post-test intervention design with a single group offering no comparison with a control group, often without follow-up to determine the long-term impact of these interventions. Study authors identified this as a limitation given the small sample sizes acquired and relative newness of the research area. Furthermore, only two studies assessed health literacy skills using validated tools with proven validity and reliability [35, 38]. Standardized health literacy assessment tools such as TOFHLA [45] and REALM (Rapid Estimate of Adult Literacy in Medicine) [46] were developed specifically to assess functional health literacy skills and can be used to measure program effectiveness in developing these skills. Without such standardized tools, limited generalizability can be made on the impact of programs on improving overall health literacy. With regards to online health information, authors reported positive subjective results of participants feeling more confident in their capacity to find and apply health information, with increased reported likelihood to retrieve information independently. Among other existing health literacy assessment tools, Norman and Skinner [11] have developed a validated eHealth literacy assessment tool to specifically evaluate interactive health literacy skills as it relates to online health information, given its increased availability and accessibility. In future research, this can further support the evaluation of health literacy programs which focus on online health information mediums.

Given the limitations in the quantity and quality of evidence supporting health literacy skills in the aging population, a need for more comprehensive intervention programs with active follow-up procedures and comprehensive evaluation measures is required. As identified in previous literature, evaluation of the effectiveness of health literacy strategies is required to identify best practice to benefit different populations [19]. Although often restricted in sample size, considerations in developing an experimental design is necessary to better support the outcomes of research supporting health literacy skill development in the older population. Furthermore, long-term outcomes need to be evaluated to demonstrate the effectiveness and efficacy of these programs in contributing to older adults’ health and well-being.

### Conclusions

The need for interactive health literacy programs continues to gain prominence in health literacy literature [18, 20] as well as the health promotion literature as it relates to aging [19, 47]. In particular, the development of culturally relevant health literacy programs for older adults is needed given how intimately health literacy skills are connected with health outcomes [16].

Moreover, supporting health literacy in the aging population is a relevant issue with important implications for public health professionals [24] especially in identifying those who may be at risk of marginal or inadequate health literacy skills. This is further reinforced by recent discussions of the potential impact of this population shift on the sustainability of the health care system [48] and the role for public health. Health literacy has been referred to as the ‘low-hanging fruit’ in support of active health care reform [49], a topic of great interest and relevance to the North American populations. An equal and sustainable health care plan is not complete without the necessary skills to make appropriate health related decisions. Further high quality research is needed to develop evidence-based interactive health literacy programs targeted specifically to older adults, evaluated using standardized health literacy assessment tools.

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### Conflict of interest statement

None declared.
Health literacy programs for older adults

References


