

Use of Internet Technology among Older Adults in Residential Aged Care Facilities: Protocol for a Systematic Review and Meta-Analysis

Sandesh Pantha ^{*}, Sumina Shrestha  and Janette Collier 

Australian Institute for Primary Care & Ageing, La Trobe University, Bundoora, VIC 3086, Australia; s.shrestha@latrobe.edu.au (S.S.); janette.collier@latrobe.edu.au (J.C.)

* Correspondence: s.pantha@latrobe.edu.au

Abstract: Internet usage may help promote the physical and mental health of older adults living in Residential Aged Care Facilities (RACF). There is little evidence of how these older citizens use internet services. This systematic review aims to explore the trends and factors contributing to internet use among aged care residents. A systematic search will be conducted on nine online databases—MEDLINE, EMBASE, PsycInfo, CINAHL, AgeLine, ProQuest, Web of Science, Scopus, and the Cochrane Library. Two reviewers will independently conduct title and abstract screening, full-text reading, critical appraisal, and data extraction. Any discrepancies will be resolved by consensus. Methodological risk of bias will be assessed using the Effective Public Health Practice Project measure and Joanna Briggs Institute checklist. We will report a narrative synthesis of the evidence. Information on factors contributing to internet use and their strength of association will be reported. If feasible, we will undertake a meta-analysis and meta-synthesis. Our review will provide information on the factors predicting internet use among older adults in residential aged care facilities. The evidence from this review will help to formulate further research objectives and, potentially, to design an intervention to trial internet access for these groups. (Protocol Registration: PROSPERO-CRD 42020161227).

Keywords: internet usage; older adults; elderly; digitalisation; residential aged care; nursing home; computer; smartphone



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1. Introduction

Older adults (people aged 65 years and above) choose to use the internet for many reasons. Understanding these reasons is essential when planning internet services targeted at this group. Few studies have explored the reasons for internet usage among older adults living in the United States [1], Germany [2], Australia, and New Zealand [3–5]. For example, Szabo et al. (2019) [3] analysed data from three waves of New Zealand's health, work, and retirement study (NZHWR) involving 1165 older adults aged 60–77. Social connectivity, online banking, and acquiring health information constituted the top three reasons for internet usage among older people. In a survey of 1040 Australian adults, it was reported that around two-thirds of older Australians aged ≥ 65 years used the internet for medical consultation [5]. Some evidence suggests that older adults participate in online health promotion activities such as cancer screening [6]. These studies reflect internet usage among older adults but are not specific to those living in Residential Aged Care Facilities (RACFs).

A few studies report lower internet use among the residents in aged care facilities compared with community-dwelling older adults of similar age [7,8]. For example, Seifert et al. (2017) [7] reported a survey of 1212 residents from 24 aged care facilities in Switzerland. The authors note that only one in six (15%) aged care residents used internet services. It was further reported that community-dwelling older adults were two times more likely to browse the internet compared with residents in RACFs [7]. In another study, it was

reported that only three per cent of residents aged 85 and above spent time on the internet, a figure eight times lower than that for community-dwelling older adults of similar age [8]. Residents of RACFs are older, frail, and have poor physical and mental health [9,10], and this could potentially explain the lower penetration of the internet into this population. Two pilot studies investigated internet usage in RACFs [11,12]. In one of the pilot crossover randomised controlled trials, nine older adults with dementia were scheduled to talk with their family members using Skype or telephone. The residents were less aggressive and had lower levels of agitation when using video calls [12]. Loh et al. (2005) evaluated reasons for the low uptake of internet technology in two RACFs in Australia [13]. Low internet utilisation was attributed to the limited access to computers. It was further reported that neither facility had a broadband internet connection. However, the study was conducted in 2005 when internet services had low penetration in the community. Since then, there have been changes in internet service provision. Many RACFs have incorporated digital technologies into their service; however, providing internet facilities does not mean residents are using internet services [9]. Besides, many governments provide online services to older residents. For example, the Australian Government is encouraging people to utilise internet media for health-related services. Australia has implemented a national digital health system, 'My Health Record' [14] and a national internet portal for aged care assistance, 'My Aged Care' [15]. With poor or no access to the internet, older adults in RACFs are prevented from accessing these services.

These studies provide a reflection on the perceived benefits of internet usage among RACF residents. While internet technology plays an important role in an older person's life in residential aged care by promoting social connectedness and physical and mental wellbeing, very little is known about its access and use among these residents. To date, no systematic reviews have synthesised evidence on internet use among residents of RACFs. Our systematic review and meta-analysis will investigate the factors influencing internet usage among the residents. We will further explore the strength of association of factors predicting internet use and the models used to determine this relationship.

2. Materials and Methods

The manuscript adheres to the preferred reporting guidelines for systematic review protocols. A complete checklist reporting guidelines is provided with this manuscript (Supplementary material File S1: PRISMA-P Checklist).

2.1. Eligibility Criteria

We will include studies based on the following criteria:

- Population: Older adults (aged 65 years or over) living in residential aged care facilities
- Exposure: Internet usage (describes internet usage or explores factors associated with internet usage)
- Study design: experimental, quasi-experimental, before and after design, observational, and qualitative
- Language: English
- Publication time: Published after 1990
- We will exclude case studies, literature reviews, commentaries, editorials, and letters to the editor as these do not involve primary data.

2.2. Information Source

We will scientifically explore the following online data sources: MEDLINE, EMBASE, PsycInfo, CINAHL, AgeLine, Web of Science, Scopus, the library of the Cochrane Collaboration, and four ProQuest databases: 1. public health, health, and medical; 2. healthcare administration; 3. nursing and allied health; and 4. dissertations and theses. These databases were included based on the existing systematic review literature [16,17], aiming to identify as many studies as possible. MEDLINE, PUBMED, and Cochrane Library are the three major databases used for systematic reviews [18]. There is some evidence to

suggest that bias can be reduced when an extensive database search is carried out [18]. There will be no language restriction in the search strategy, but studies in languages other than English will be excluded.

We will undertake the citation search (of the included studies) to identify any additional studies relevant to our review.

We will not search grey literature as there is evidence that a search strategy used for grey literature may not be replicable [19].

2.3. Search Strategy

We identified three search concepts to address our research question—older adults, residential aged care, and internet-based technology. The Peer Review of Electronic Search Strategies (PRESS) guidelines [20] were followed to develop the search strategy. We incorporated the technical inputs from an information scientist during the development of the search strategy. A second information scientist peer-reviewed our search strategy. The MEDLINE search is presented along with this manuscript (Supplementary Material File S2: MEDLINE Search).

2.4. Screening and Selection of Studies

The output from each database will be imported to Endnote 9.2 and combined. The final list of citations will be exported to Covidence [21,22]. Duplicates will be identified and removed using Covidence.

We will undertake a two-step screening process for selecting the study: 1. title and abstract screening, and 2. full-text screening. Two reviewers will independently conduct screening at each stage against set criteria for inclusion and exclusion. A third member of the review team will resolve the disagreements, and the final decision will be made by consensus within the review team.

Two reviewers will undertake a thorough assessment of citations of the included studies to locate any potentially relevant studies. Such studies will be selected based on consensus among the reviewers.

A PRISMA flowchart will be presented to describe the flow of articles at each stage of the review [23].

2.5. Risk of Bias Assessment

Quantitative studies will be assessed using the Effective Public Health Practice Project (EPHPP) tool. This measure has eight sections, each scored as “strong”, “moderate”, or “weak”. Depending on the number of weak ratings, studies will be graded as strong, moderate, or weak [24].

Similarly, Joanna Briggs Institute (JBI) critical appraisal checklist will be used to evaluate the methodological robustness of qualitative studies [25]. The JBI tool coherently evaluates the intrinsic methodological quality of a qualitative study. It has ten questions to evaluate the congruity between the research methodology with five components—proposed theoretical framework, research questions, data collection methods, data analysis process, and the interpretation of results [25,26]. Each question is answered either ‘yes’, ‘no’, ‘unclear’, or ‘not applicable’.

We will use a table to narrate the findings from the risk of bias.

We will check the manuscript for ethics approval. We will not include any studies that have been retracted post publication..

2.6. Data Extraction

We will design and pilot test the data extraction tool. The tool will be amended if necessary. This task will be undertaken independently by the two reviewers. Any discrepancies during extraction will be resolved by verifying the data in the article. If the article(s) is/are not clear, we will email the author for clarification.

If multiple manuscripts are reported from a data set, we will report the first published study with the outcome of interest as the primary source. Information from the multiple sources will be collated, compared for consistency before data synthesis, and reported in the review. There is a possibility that some cohort studies may include analysis at different points in time. In such cases, we will include both manuscripts and make a note of it.

We will obtain the following data:

1. Citation
2. Country
3. Period of data collection
4. Study design (randomised control trial, quasi-experimental, before and after study, cohort, case control, survey, qualitative, other)
5. Sampling strategy
6. Participant characteristics (total participants, frequency distribution based on gender, mean and standard deviation of age)
7. Internet usage (frequency of internet usage, the purpose of internet usage, the device used for the internet, the mean and standard deviation of time spent on the internet);
8. Factors predicting with internet use (we will extract information on factors related to internet use (associated or no association), the model used to determine the association (bivariate or multivariate), strength (coefficient and 95% confidence interval), effect size (power) of the tested model (adjusted or non-adjusted), and report whether those models were standardised or non-standardised)
9. From qualitative studies, we will also collect information about the study's philosophical or theoretical basis, methodological approach, and specific details about participants. We will also report the study population's context and culture, phenomena of interest, quotes from participants, and statements, assumptions, and interpretations from the researchers.

2.7. Data Synthesis

We will follow the convergent segregated approach for systematic reviews with quantitative and qualitative methods [27]. Quantitative and qualitative findings will be synthesised separately at first, then linked together to generate a conclusion. We will report a narrative synthesis for outcomes lacking adequate data.

2.7.1. Meta-Analysis

If sufficient information is available, we will undertake a meta-analysis to pool findings from included studies [28] using the Review Manager (RevMan, Version 5.3, Revman International Inc., New York, NY, USA) software package. We anticipate a substantial variety in the study design and outcome variables. Information on the prevalence and factors predicting internet use will be extracted and pooled across different outcomes and study designs, followed by a subgroup analysis. We will extract the following information for the meta-analysis: participant characteristics (age, standard deviation), gender, the prevalence of internet usage (percentage and standard deviation), factors contributing to internet usage (risk ratio, 95% confidence interval). The analysis will be conducted at the study level, not individual participants.

The model for meta-analysis will be determined using the test of heterogeneity (I^2 test). We will use a fixed-effects model if the observed heterogeneity is low (i.e., $I^2 < 25\%$) and a random-effects model if heterogeneity is moderate to high (i.e., $I^2 \geq 25\%$) [29]. For each factor that is tested, a summary statistic of each included study will be reported using a Risk Ratio (RR) and 95% confidence interval. Where individual studies report an Odds Ratio (OR) as a measure of association, we will convert it to Risk Ratio using the procedures in RevMan Version 5.3. A forest plot of the pooled estimates as a risk ratio (95% confidence intervals) will be presented for each outcome. A sensitivity analysis will be carried out to understand the methodological robustness of a study. If the study involves ten or more

studies, we will perform a funnel plot analysis to detect any publication bias among the included studies [30,31].

If the information provided in the manuscript is not complete, we will email the corresponding author for the missing values. We will document such communication in our report. If the information could not be obtained even after a follow-up email (sent 14 days after the initial email), we will exclude incomplete studies from the final analysis.

Sensitivity Analysis

Sensitivity analysis allows us to check if the results from a meta-analysis were affected by the inclusion of certain studies based on predefined criteria. We will undertake a sensitivity analysis to determine if the outcome is influenced by omitting one or more studies from the analysis. For example, we will conduct a sensitivity analysis to examine the effect of bias by removing studies with a high risk of bias.

Subgroup Analysis

Subgroup analysis will help us to understand the mean effect and variation in different study populations and different study designs. For example, we will consider a subgroup analysis to determine if there are studies with a control group and without a control group. Gender influence on internet use will also be explored through subgroup analysis. A further subgroup analysis will be based on the year of publication to check if there were any differences before and after 2010 when the technological advances became more prominent. For example, Facebook and other social media applications became popular after 2010. We will calculate the mean effect and variance for each group and compare subgroups. There is some evidence to suggest that subgroup analysis needs to be undertaken with caution and may produce misleading inferences [31]. We will consider a subgroup analysis if there are at least five studies [28] in each subgroup.

Meta-Biases

We will conduct a funnel plot analysis to identify publication bias among the studies included in the review. However, it has been suggested that the sensitivity of a funnel plot analysis to detect publication bias is limited if the meta-analysis is conducted with less than ten studies [30,31].

2.7.2. Meta-Aggregation

We will conduct a meta-aggregation to synthesise qualitative data [27]. Contextual information will be compiled and categorised into groups based on similarity. These statements will be referred to as findings from the review synthesised from the qualitative data of studies included in the review. If sufficient studies are not available to conduct textual pooling, findings will be presented in narrative form.

3. Discussion

Our systematic review will generate evidence on internet usage among older adults living in RACFs. It will further explore the barriers and enablers that contribute to older residents' use of internet technology. Outcomes from this review will facilitate improving services to the consumers of residential aged care facilities.

Residential aged care facilities offer standard services such as meals and personal care. Internet access is not a component of these essential services. We believe this review's impact and further intervention work would be to add internet provision as a standard service offered by a facility.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/digital2010003/s1>, Supplementary Material File S1: PRISMA-P statement and Supplementary Material File S2: MEDLINE Search strategy.

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Conflicts of Interest: The authors declare that they have no conflict of interest. This protocol was presented as a poster at the 54th Annual conference (virtual) of the Australian Association of Gerontology (9–11 November 2021).

Protocol Registration and Amendments: We prospectively registered our review protocol with the International Prospective Register of Systematic Reviews (PROSPERO) (Registration number: CRD 42020161227). Any changes in the registered protocol will be documented and reported in the manuscript.

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