e-Health interventions to reduce older persons' loneliness

Background

A growing body of literature has shown that loneliness and social isolation are important risk factors for the development of depression (1-5). Loneliness has been defined as the discrepancy between a person's desired and actual social relationships. Social isolation, on the other hand, is an objective measure of social interactions and relationships (6). Recent statistics indicate that 19% of Australians aged 75 and above experience loneliness (7). Older adults are particularly prone to feeling lonely due to the death of partners and friends, retiring from work, deterioration in physical health, being more likely to live alone, and having fewer close relationships (8). Evidence shows that loneliness is also linked to chronic physical conditions, such as coronary heart disease and stroke (9), as well as to dementia (10-14). As such, it has an indirect effect on mortality through associations with these health conditions, as well as a direct effect on mortality (15). Higher levels of loneliness have also been significantly associated with suicidal ideation and suicide attempts (16).

In addition to the implications of loneliness on health and wellbeing, there is also an increase in health and social care spending associated with loneliness (17). Evidence has found that lonely older adults use more healthcare services compared with those who are not lonely (17-20). There is an even greater increase in healthcare spending if lonely older adults develop other health conditions, such as depression. Therefore, to prevent depression in older adults, there is a compelling case for addressing loneliness to mitigate the harmful effects of subsequently developing depression.

Intervention modelled

An increasing body of literature suggests that using computers and the internet may reduce loneliness, particularly in the older adult population (21-23). The opportunity to communicate regardless of physical distance provides the ability to maintain relationships with friends and family, and thereby gain social support (24). Two previous studies have examined the effectiveness of computer and internet training to reduce loneliness among older adults that included volunteer visitors in the Netherlands (25) and the UK (26). Using results reported in these two studies, the model assumed that the number of lonely adults decreased by 11.8% in the group receiving the intervention compared with the group of older adults who did not receive the intervention. The evidence also showed that at follow up, of those who had never used the internet before, 68% reported using it at least once a week, 28% at least once a day, and 9% many times a day (26).

For the current model, the intervention was tailored to the current Community Visitors Scheme (CVS) available in Australia and is considered an add on component of the current CVS (27). The CVS is available to recipients of the Australian Government subsidised residential aged care services or Home Care Packages who have been identified by their aged care provider as being at risk of isolation or loneliness (28). The Australian Government funds organisations (referred to as CVS organisations) to recruit and train volunteer visitors, whose primary role is to provide friendship and companionship to the socially isolated consumer. CVS organisations provide volunteer visitors with a basic training/orientation on their role and their obligations.

There are currently three types of visits available:

1. A one on one visit by a volunteer visitor to a care recipient in an Australian Government subsidised residential aged care home;
2. A one on one visit by a volunteer visitor to a care recipient of a Home Care Package in their home; or
3. A group visit that consists of two or more care recipients at the same time, in an Australian Government subsidised aged care home.

The computer and internet training intervention consists of two components. First, special training is delivered to volunteer visitors (i.e. 10 volunteers per group) by an IT trainer on basic computer and internet use, as well as on more advanced topics, such as online communication, shopping and entertainment. It was assumed that in total 24 hours of training is provided to volunteer visitors (29). The second component of the intervention involves sharing of the computer and internet knowledge with the CVS recipient. It was assumed that computer and internet training is delivered at all of the 20 visits per year that an 'active visitor' is expected to undertake as part of their commitment to the CVS. If a CVS recipient elects to spend only some time on the training i.e. 50% or 75% of visits, this will not impact the results modelled here.

The eligible population for the intervention modelled are recipients of the current CVS program who have no previous computer and internet experience and who have no negative attitudes towards computers. In Australia, recent survey data indicates that 21% of older adults have no

computer or internet experience but that 31% of those with no experience were interested in using them (30).

The primary outcome of this evaluation is the return on investment (ROI) ratio. This ratio includes the cost of the intervention in relation to any cost savings. In the current model, cost savings only related to direct healthcare costs associated with loneliness and the subsequent treatment of depression. For an intervention to be considered cost effective, it would need to have a ROI ratio greater than 1. This means that the cost savings are greater than the costs of the intervention (e.g. a ROI ratio of 1.5 means that for every $1 invested, there will be a gain of $1.50).

Assumptions

The cost of the intervention includes the cost of the volunteer training, equipment and intervention delivery. All salary costs described below include 30% on-costs, such as annual leave loading and superannuation.

Volunteer training: It was assumed that 24 hours of training for volunteer visitors would be required on internet and computer use. It was also assumed that training will be provided to a group of 10 volunteer visitors by an IT trainer. The required facilities for delivering the IT training were assumed to be available, given that volunteer visitors already receive other types of training under the general CVS program. The wage rate of an IT trainer was costed at an hourly rate of $50 (31). The time spent by volunteers receiving the training was also costed at an hourly rate that reflects 25% of the earnings in people aged 55 and older (31). The information booklets provided to the volunteer visitors were costed at $10 per booklet in addition to the time of the IT trainers to develop these booklets.

Equipment: The intervention includes the provision of a basic computer and software to older adults. While it was expected that everyone residing at home will need to be provided with this equipment, it was assumed that 30% of residential aged care facilities are already equipped with computers that care recipients can use. Internet service was assumed to be available in all residential aged care facilities. An assumption was made that internet is also free of charge for those receiving one on one home visits, considering current government initiatives, such as 'Tech Savvy Seniors' (32) or 'Be Connected' (33), which aim to increase confidence in older adults to use technology.

Delivery of intervention: As the intervention was assumed to be delivered as part of the 20 visits per year that an 'active visitor' should undertake, no additional volunteer time was costed. It was also assumed that residential aged care facilities have the space available to deliver the internet and computer training to a group. Room space for a computer and equipment was also assumed to be available for one on one home and residential care visits. Information booklets that were provided to the CVS recipients were costed at $10 per booklet.

Cost savings: The total cost savings arising from the intervention were estimated by calculating the aggregate sum of all cost savings attributable to lower healthcare costs associated with fewer physician consultations (20) and self harm associated hospitalisation due to avoidance of loneliness (16). In addition, cost savings due to avoidance of treatment for depression were also considered. The average annual healthcare cost attributable to a diagnosed case of depression was sourced from a previous Australian study (34).

Alternative scenarios

Scenario 1) This scenario considered the internet cost as part of the intervention for those receiving one on one home visits, assuming a broadband plan of $32.76 per month (or $393.06 per year). Internet service for those receiving visits in residential care facilities was assumed to be free of charge.

Scenario 2) This scenario assumed a lower effectiveness of the intervention (4.4% reduction in lonely people rather than 13.5%), based on a previous summary of evidence (35).

Results

Cost effectiveness findings

Results for the model analysing the cost effectiveness of the intervention are presented in Table 1. Overall, the total cost of implementing the intervention was approximately $2.2 million (or $464 per CVS recipient). The intervention subsequently produced $2.3 million in cost savings after 3 years and $4.7 million after 5 years due to reductions in healthcare treatment costs. The aggregate ROI ratio was estimated to be 1.02 after 3 years and 2.14 after 5 years. This means that for every $1 paid to run the intervention, the return will be $1.02 after 3 years or $2.04 after 5 years. Across the three types of volunteer visits, delivering the intervention as part of the residential group visits resulted in the greatest ROI ratio, whereas the lowest ROI was found for one on one home visits.

When analysing health outcomes, it was found that delivering the intervention to all CVS recipients resulted in a total of **0.5 million loneliness free days** after 3 years **and 1.4 million loneliness free days** over 5 years.

Results from alternative scenarios

Results from scenario 1 showed that incorporating the internet cost for those receiving one on one home visits resulted in a ROI of 0.47. The impact of a lower intervention effect in scenario 2 reduced the ROI ratio from 1.02 to 0.25 in the 3 year model and from 2.14 to 0.54 in the 5 year model. This means that the cost of the intervention were greater than the resulting cost savings in the alternative scenarios.

Table 1: Summary of results for e-Health intervention to reduce older persons' loneliness

	All types of visits (n=4791)		One on one visits in residential aged care (n=2008)		Group visits (6 recipients per volunteer) in residential aged care (n=1338)		One on one visits in the home (n=1445)	
	3 year model	**5 year model**	**3 year model**	**5 year model**	**3 year model**	**5 year model**	**3 year model**	**5 year model**
Intervention costs	$2.22M	$2.22M	$0.81M	$0.81M	$0.13M	$0.13M	$1.28M	$1.28M
Cost to Government	$1.43M	$1.43M	$0.38M	$0.38M	$0.09M	$0.09M	$0.96M	$0.96M
Cost to Individuals	$0.79M	$0.79M	$0.43M	$0.43M	$0.05M	$0.05M	$0.31M	$0.31M
Healthcare savings	$2.27M	$4.75M	$0.95M	$1.99M	$0.63M	$1.33M	$0.69M	$1.43M
Loneliness related	$0.34M	$0.69M	$0.14M	$0.29M	$0.09M	$0.19M	$0.10M	$0.21M
Depression related	$1.93M	$4.05M	$0.81M	$1.70M	$0.54M	$1.13M	$0.58M	$1.22M
Total net savings*	-$0.05M	$2.43M	$0.13M	$1.18M	$0.50M	$1.19M	-$0.68M	$0.06M
Cost per person	$464	$464	$405	$405	$100	$100	$882	$882
ROI	1.02	2.14	1.17	2.45	4.73	9.89	0.54	1.12
Loneliness free days	537,595	1,382,271	225,316	579,336	150,136	386,032	162,142	416,903

Notes: ROI: return on investment per $1 invested. *A negative value indicates a cost.

Implementation considerations

While evidence on cost effectiveness is the focus of this project, there are other criteria apart from cost effectiveness that can influence whether and to what degree interventions are likely to be rolled out in routine practice. These criteria are not captured in the technical cost effectiveness results but are potentially very important from a decision making context. Some of these considerations are summarised in the Table below. The colour coding of each criterion is an attempt to visually summarise whether these secondary considerations impact on the results in a positive or negative way (red = negative, amber = uncertain, green = positive). A code of 'green' implies that the secondary consideration strengthens the case for investing in the intervention. A code of 'amber' means that the secondary consideration reduces certainty in the case for investing and a code of 'red' means that these considerations do not support investment in the intervention.

Implementation considerations		Overall Rating
Potential secondary effects	The results of this modelling are conservative, as they do not capture all the potential benefits beyond the CVS recipients. It can be expected that volunteer visitors also derive fulfilment from sharing their knowledge on computer and internet use with the CVS recipient. The potential benefits to carers has also not been included. This model also underestimates the benefits as it considered only the impact of loneliness in relation to depression and not to other health conditions such as dementia, stroke, or heart disease. Therefore, the ROI analyses have probably underestimated the positive outcomes of this intervention.	**Positive**
Equity	People living in remote areas may experience difficulty with stable internet access and as such may not benefit from the intervention. As the Government will provide computer equipment and cover the cost of internet for CVS recipients who do not already have access in their place of residence, this is likely to reduce socioeconomic inequalities in the target population. There may be a risk to CVS recipients of becoming targets for abuse and cybercrime when using the internet which is of particular concern for individuals with lower levels of general education and digital literacy. In such cases, the e-Safety Commissioner can provide resources and services, including a reporting and investigation service. (37)	**Uncertain**
Strength of evidence	The quality of evidence on the effectiveness of the intervention was low, as evidence was sourced from non-randomised controlled trials. However, the evidence on the associations between loneliness and depression as well as loneliness and mortality was relatively strong.	**Negative**
Acceptability	A recent report indicated that CVS visitors already fulfil a range of tasks, including skill development for use of technology (27). Therefore, it can be assumed that some visitors may already share knowledge with CVS recipients on computer and internet use, which supports the acceptability of the intervention. However, not all CVS recipient may favour the use of computer and the internet due to concerns around privacy and personal security.	**Uncertain**
Feasibility	Given that the intervention was tailored to the current CVS program available in Australia, the intervention can be implemented very easily into current practice. However, not everyone who could benefit from the CVS is currently using it and there are also requests to open up the program to recipients of the Commonwealth Home Support Program. The sub optimal awareness of the CVS (among service providers, consumers and broader public) remains the key issue identified in the annual review report of CVS (27). The annual report did not identify the lack of volunteers to be a current issue but acknowledged the complexities of matching volunteer visitors with consumers' needs (27). In some cases more hours of training of volunteers may be required to deliver this intervention and paid support may be required to upskill volunteers or to deliver the intervention instead. Pre-existing programs that are similar including 'Tech Savvy Seniors' (co-funded through state governments and the private sector) and 'Be Connected' (funded by the Australian Government), suggesting that governments may be willing to fund this type of intervention. Improvements in mental health services for older Australians who are at risk of social isolation and loneliness has also been identified as a priority for the Australian Government (36).	**Positive**
Sustainability	While currently a proportion of the older adult population have no computer and internet experience, it is expected that this knowledge gap will disappear in future generations and that the implementation of this type of intervention would require less intensive training and support for computer use, focussing more on encouraging use of specific e-Health programs.	Uncertain

Recommendations

This analysis indicated a positive ROI when implementing computer training for older adults in order to reduce loneliness. However, this result should be interpreted with caution given that the evidence of effectiveness of the intervention was weak. The modelling only considered the impact of loneliness on depression and not on other health conditions such as dementia, stroke, or heart disease. As such, the findings are considered conservative and the intervention may result in greater ROI if these additional impacts were considered. The findings also do not include productivity gains in the ROI calculation, given the age of the target population, and unlikeliness of their participation in the labour force.

As the intervention modelled was tailored to the current CVS available in Australia, implementing the intervention within the Australian context is feasible. Providing computer and internet training as part of a group visit to residential care recipients seems to provide good value for money. As such, given the low costs associated with this intervention and likely benefits, this intervention could be considered for roll out within CVS services. However, program evaluation should accompany this roll out to ensure the real world outcomes match those which have been observed in preliminary studies.

Take home messages

With the rising ageing population in Australia, there should be a greater focus on addressing loneliness in older persons to prevent the need for more intensive support associated with treating depression. Providing training to volunteer visitors on computer and internet use that they can share with older adults as part of the CVS will potentially reduce loneliness in older adults, reduce cases of depression and likely result in healthcare cost savings. However, while the intervention represents good value for money, there is a high level of uncertainty due to the low level of evidence. Further research may help to strengthen the evidence base.

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