Feasibility of internet-delivered mental health treatments for rural populations

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Abstract

Purpose: Rural populations face numerous barriers to mental health care. While internet-delivered mental health treatments may offer an accessible and cost-effective answer to these barriers, there has been little evaluation of the feasibility of this approach among rural communities.

Methods: Data were obtained from a random rural community sample through the third wave of the Australian Rural Mental Health Study. Attitudes towards internet-delivered mental health treatments and availability of internet access were explored. Data were analysed to identify sub-groups in whom internet-delivered treatments may be usefully targeted.

Results: 1246 participants completed the survey (mean age 59 years, 61% female, 22% from remote areas). Overall, 75% had internet access and 20% would consider using internet-based interventions, with 18% meeting both of these feasibility criteria. Logistic regression revealed feasibility for internet-delivered mental health treatment was associated with younger age, male gender, being a carer, and a 12-month mental health problem. Participants who had used internet-delivered services in the past were significantly more likely to endorse these treatments as acceptable.

Conclusions: There is considerable potential for internet-delivered treatments to increase service accessibility to some sub-groups, particularly among people with mental health problems who are not currently seeking help. Resistance to internet treatments appears to be largely attitudinal, suggesting that enhancing community education and familiarity with such programs may be effective in improving perceptions and ultimately access.

Since the initiation of the National E-Health Strategy in 2008 [1], Australia has witnessed an increase in the development of internet-delivered programs targeting mental health. This reflects a global trend, with the use of e-health initiatives in recent years rising worldwide [2-5]. A strong body of evidence is emerging to suggest that such programs provide an effective treatment option, and result in improvements in mental health similar to those achieved by face-to-face therapy [6-8]. With Australian government bodies continuing to invest in the conception of open-access services such as *myCompass*, *MoodGYM* and *eheadspace*, establishing positive public perceptions of these programs is important to ensure the maximum public benefit from this investment.

It has been suggested that tailoring internet-delivered programs to rural settings may overcome many of the specific treatment barriers experienced by these populations [9]. While perceptions of computer-delivered psychological treatments generally appear positive among participants [10] and clinicians [11], there has been little evaluation of the opinions of the general public, and in particular, of rural populations [7], regarding this treatment modality. In light of the reduced availability of traditional mental health services in rural areas, internet-delivered treatments hold much promise in overcoming service-based barriers to mental health care. Thus, establishing the acceptability of this treatment modality in rural populations is essential in realising this potential. Considering that the availability of internet access decreases with increasing remoteness [12], additional barriers may affect rural populations wishing to access internet-delivered treatments, threatening the feasibility and promise of these approaches in the very populations in which they are thought to have the most utility.

The current study uses survey data from a large community-based rural sample to explore the feasibility of internet-delivered interventions for mental health problems. It aims to investigate two key areas of feasibility: levels of internet access, and attitudes towards internet-delivered mental health treatments.

Methods

Study sample

Participants were part of the Australian Rural Mental Health Study (ARMHS), a longitudinal study of mental health in rural and remote New South Wales (NSW), which began data collection in May 2007. Residents of non-metropolitan NSW were selected randomly from the Australian Electoral Roll, with oversampling of remote areas. A full description of the study can be found in Kelly et al [13]. The current analysis uses data from the third wave of ARMHS, conducted from February 2011 to March 2012. Written informed consent was obtained at baseline, with verbal or informal consent at subsequent waves.

The geographical classification of participants was determined using the Australian Standard Geographical Classification (ASGC) categories; participants were divided into inner regional, outer regional, remote and very remote residents. Ethical approval was obtained from the Human Research Ethics Committees of the Universities of Newcastle and Sydney, and the Greater Western, Hunter New England and North Coast Area Health Services.

Measures

Where standard measures were not used for the focal survey items, they are provided in full in Appendix 1.

Participant characteristics. Participants reported their age, gender, marital status and commitments, including regular employment, living with children, and caring for a disabled or ill family member or friend. Assessment of perceived financial prosperity was adapted from the Household, Income and Labour Dynamics in Australia Survey [14]; participants were asked to rate their perceived prosperity on a six-point scale from "prosperous" to "very poor".

Availability of internet access. Self-report questions explored whether participants had easy access to a computer with internet (dialup, ADSL, or broadband) in their home.

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Mental health. Participants were asked whether they had experienced any mental health problems (such as stress, anxiety or depression, or worries about alcohol or drugs) in the past 12 months. Those who gave a positive response were asked whether they had sought any help or advice for these problems. Participants also completed the K10 psychological distress scale (K10), Patient Health Questionnaire-9 (PHQ-9), Alcohol Use Disorders Identification Test (AUDIT), and self-reported whether they had used cannabis in the past 6 months.

Suicidal ideation was measured using item 9 of the PHQ-9. Responses to this item were dichotomised into a "yes/no" variable.

Perceptions of internet-delivered mental health services. Two questions regarding participants' perceptions of computer/internet-delivered health services were included in this analysis:

- "*Have you ever used the computer or the internet to access mental health information or treatment in the past*"?
- "*Would you consider using the computer or the internet as a way of accessing treatment for your mental health*"?

Data analysis

Data were analysed using SPSS (version 20; SPSS, Chicago, IL, USA). A Venn diagram was constructed using Venny [15] to depict the relationship between internet access, willingness to use internet-delivered mental health treatments, history of using internet-delivered mental health services, and residing in a remote or very remote area.

Overall scores on the K10, PHQ-9, AUDIT, and self-reported cannabis use item were used to characterise the current symptom profiles for participants who self-reported a 12-

month mental health problem on the single-item measure (which was the gateway item to questions about recent service access and use).

Participants were considered to have met *"Feasibility Criteria"* for internet-delivered mental health treatment if they had easy access to the internet either at home or elsewhere, and also gave a positive response to the second question above. Using this outcome, a multivariate logistic regression containing selected predictor variables (participant characteristics, 12-month mental health and treatment-seeking status, suicidal ideation, history of using internet-delivered mental health services, and geographical location) was conducted to determine the independent characteristics of participants for whom these treatments are a viable option. The threshold for statistical significance was set at $p < .01$. Results are expressed as odds ratios (OR), adjusted odds ratios (AOR) and 99% confidence intervals (CI).

Results

Insert Table 1 here

Twelve hundred and sixty-one participants completed the 3-year survey used for the current analysis; however, 15 were excluded as they currently resided in a metropolitan area. Sample characteristics are shown in Table 1.

Three-quarters of respondents (n = 928) reported access to the internet in their home. Internet access significantly decreased with increasing rurality, from 79.1% of people living in inner regional areas to 59.8% of people in very remote areas ($\chi^2_{(3)} = 18.03$, $p < .001$). The type of internet access available to participants also differed by geographical region ($\chi^2_{(9)} = 18.53$, $p = .030$), as shown in Table 2. Importantly, very remote respondents were less likely to report access to faster ADSL connections.

Insert Table 2 here

Of the total sample, 11.8% (n = 147) had used internet-based mental health information or treatment in the past. Additionally, 20.1% (n = 250) would consider using an

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internet-delivered mental health treatment in the future. Overall, 18.1% of participants (n = 225) met our feasibility criteria, that is, had both easy access to the internet and would consider using internet-delivered mental health treatments. Feasibility was significantly higher in people reporting a 12-month mental health problem (33.3%) compared to those with no recent mental health problems (11.8%; $\chi^2_{(1)}$ = 79.97, p < .001). Similarly, among people reporting a 12-month mental health problem, feasibility was significantly higher in those who had sought help (41.0%) than those who had not (25.4%; $\chi^2_{(1)}$ = 10.03, p = .002). The relationship between internet access, willingness to use internet-delivered mental health treatments, history of using internet-delivered mental health services, and residing in a remote area is displayed in Figure 1.

Insert Figure 1 here

Univariate analysis

People who self-reported a mental health problem in the past 12 months had significantly higher symptoms of psychological distress (17.20±5.93 vs. 12.20±3.10, F (1, 1215) = 369.19, p < .001), depression (5.24±4.67 vs. 1.66±2.19, F (1, 1220) = 332.29, p < .001), alcohol use (5.47±4.90 vs. 4.15±3.12, F (1, 1021) = 26.74, p < .001) and cannabis use (8.8% vs. 2.6%, $\chi^2_{(1)}$ = 23.46, p < .001) than people who reported no mental health problems.

The univariate ORs for all predictors are displayed in Table 3. Respondents who met feasibility criteria were younger, employed, and more likely to live with children. The highest feasibility was observed among participants with a 12-month mental health problem who had sought help, followed by those who had not sought help, both of which were higher than those with no 12-month mental health problem. Participants with recent suicidal ideation were more likely to meet feasibility criteria than those without suicidal ideation. Among the 147 participants who had previously used internet-based services for mental health information or treatment, feasibility was also significantly higher.

Multivariate analysis

Insert Table 3 here

The logistic regression model was significant when compared to the constant-only model ($\chi^2_{(16)}$ = 214.00, p < .001), indicating that the predictor variables as a set were reliable in distinguishing between participants who did and did not meet feasibility criteria for internet-delivered mental health treatments. As shown in Table 3, a small but significant effect was observed for age, with younger participants being more likely to meet feasibility criteria (i.e., each one-year increment in age was associated with approximately a 3% decrease in the odds). Male gender was associated with a 1.5 fold increase in the odds of meeting feasibility criteria. Participants caring for an ill or disabled family member or friend were also significantly more likely to meet criteria. The presence of a 12-month mental health problem was a significant predictor, with the odds of meeting feasibility criteria approximately doubling for participants who had not sought help for their problem, and tripling for those who had sought help, compared to those without a 12-month mental health problem. The largest effect was observed for participants who had previously used computer/internet-based mental health services; the odds of meeting feasibility criteria were six times greater than for those who had not previously used the internet for this purpose.

Discussion

The present analysis found mixed evidence for the feasibility of internet-delivered mental health treatments for rural areas; while general community attitudes are suggestive of hesitation towards these treatments, several important sub-groups indicated particular interest. On a positive note, feasibility was significantly higher among people with recent mental health problems than in the general sample, indicating a greater willingness to access internet-delivered treatments among those who are most likely to benefit from them. This concurs with previous observations that seeking health information via the internet is more common among people with mental disorders [26]. The most promising findings may

be those relating to people with 12-month mental health problems who had not sought assistance. One-quarter of this sub-sample reported a willingness and ability to use internet-delivered treatments, which indicates the potential for these treatments to have substantial public health benefits. These findings suggest that internet-delivered treatments have the ability to facilitate contact with mental health services among a substantial sub-group of people who may otherwise receive no assistance. Public health strategies to reduce stigma and enhance perceptions of mental health services in general, and internet-delivered services in particular, may further increase this rate. Evidence from a range of previous studies shows that public health strategies, targeting mental health in particular, are effective at increasing knowledge and understanding of mental illness, as well as improving attitudes towards help-seeking [22-24].

Community-wide strategies to enhance awareness of the benefits of internet-based treatments may be useful prior to the initiation of internet treatments in rural areas. Social media sites such as Facebook and Twitter may play an important role in promoting internet-delivered treatments [18, 25]. Health professionals may also be valuable change agents, both in introducing patients to available internet-delivered treatments and providing support to patients using them; evidence suggests that support provided by general practitioners to patients engaged in internet-delivered mental health treatments leads to similar outcomes as that provided by a psychologist [27].

Despite the aims of internet-delivered interventions to increase access to mental health care, the present study suggests that there may be some impediments to implementation in rural regions. The low overall rate of feasibility observed suggests a general hesitation regarding this method of intervention within rural and remote communities. This reflects research in metropolitan areas [16], and suggests that a major challenge to the widespread uptake of internet-delivered mental health treatments is related to their promotion and perception, rather than their accessibility. This is supported by previous general community findings that web-based mental health resources are viewed as less

helpful than information provided by a book or health educator [17]. Attitudinal barriers are a key issue for mental health service utilisation in general [20, 21], rather than pertaining specifically to services delivered via internet; therefore, our findings relate to the overall need to reduce attitudinal barriers to mental health care. It is important to note that the low rate of feasibility observed in the overall sample is likely to be partially related to the low prevalence of current mental health problems in this population. Seventy per cent of participants reported no concerns with their mental health during the previous 12 months, and hence these people may have indicated a lack of interest in internet-delivered mental health treatments because they did not feel these programs would be relevant to them.

The reluctant attitudes towards internet-delivered treatments in the general sample may also reflect a lack of exposure, with less than 12% of our sample having previously utilised this type of service. Importantly, among those who did have experience with this method of delivery attitudes were largely positive, concurring with previous research [10,18]. This suggests that exposure to these treatments, and overcoming the initial hesitation and public perception issues, are likely to be important steps in increasing awareness and positive attitudes, and by extension, utilisation of these services. As participants were asked about their previous use of the internet for 'mental health information *or* treatment', it is possible that the impact of using an internet-delivered mental health treatment specifically has been overestimated in the present analysis.

While the availability of internet access decreased with increasing remoteness, this had limited impact on feasibility. Only 7% of participants who would consider using internet-based mental health treatments had a lack of internet access. Strategies to improve internet access in rural and remote regions may therefore do little to encourage help-seeking behaviours independently, and increasing positive attitudes towards mental health service utilisation is likely to be essential to take advantage of the growing availability of internet-delivered services. It is, however, important to note that very remote participants in our study reported lower access to high-speed ADSL internet. Although attitudes towards internet-

based mental health services are more positive, when resources include interactive options rather than being heavily text-based [19], these approaches may be more difficult to implement in very remote areas with slower internet connections.

A small but significant effect was observed for age in our regression analysis. Older individuals typically report less comfort, efficacy and control than younger people when using computers [28], while educating older people about computer use has been found to both increase their computer skills and initiate a range of additional psychosocial benefits [29]. Therefore, this may also improve their perceptions towards internet-delivered mental health treatments. Conversely, these findings suggest an important potential for internet-delivered treatments to engage young people – who are less likely to seek help for mental health problems [30] or to access mental health services – confirming previous research [31, 32].

When all predictors were accounted for, we also observed a trend for gender, with males 1.5 times more likely than females to meet feasibility criteria for internet-delivered mental health treatments. This was particularly interesting, as males with a 12-month mental health problem were less likely than females to have sought help in the past year, consistent with previous research [21]. Males may feel more comfortable with the format of computer-delivered rather than face-to-face mental health assistance; considering the international observation of elevated suicide rates among young males in rural and remote areas [33-35], increasing the availability of computer-delivered services in non-metropolitan areas may enhance the potential for early intervention in this vulnerable group.

Although it did not remain significant in the regression (after adjusting for gender and age effects in particular), participants with suicidal ideation were more likely to meet feasibility criteria for internet-delivered mental health treatments in the univariate analysis. Both international [36] and Australian [37] research shows that the majority of individuals displaying suicidality do not seek help; therefore, our findings are noteworthy as they suggest the potential for internet-delivered treatments to address this issue. Pursuing research among individuals with suicidal ideation to increase the appeal and applicability of

internet-delivered treatments would be a valuable source of information to direct the development of interventions aimed specifically at reducing suicidality.

This study has several limitations. Although younger age was positively associated with our outcome, our sample was older, with a mean age of 59 years. Therefore our findings may underestimate the acceptability of internet-delivered mental health interventions; notwithstanding, age was controlled for in the regression, such that sample bias is unlikely to be a major contributor to the reported outcomes. The survey item regarding attitudes towards internet-delivered treatments was non-specific, inquiring only about general mental health treatments. This may have limited the number for individuals who reported a willingness to use internet-delivered treatments. An important step for future research would be to include more detailed questions to determine the specific types of internet-delivered treatments people may be willing to use. The use of only a single item measure of mental health problems also limits the reliability this factor; the use of a validated measure in future would be advantageous.

Although the implementation of internet-delivered interventions is becoming an increasingly popular recommendation in the mental health literature, our findings suggest that community attitudes may pose a considerable obstacle to the uptake of these treatments in rural areas. While internet-delivered treatments may be a potential solution to rural barriers to help-seeking, significant communication and promotion, targeted at these barriers, is urgently required in rural communities. Initiating trials within the sub-groups identified (e.g. younger people – particularly males – people with mental health problems, carers) may be useful to begin the process of evaluating and tailoring these programs to better suit rural and remote communities.

Acknowledgements

Conflict of interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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Appendix 1. Non-standardised survey items

Perceived financial prosperity

Given your current needs and financial responsibilities, would you say that you and your family are …
- Prosperous
- Very comfortable
- Reasonably comfortable
- Just getting along
- Poor
- Very poor

Children in the house
How many children live in your household more than 50% of the time?

Caring
Do you care for a disabled or ill family member/friend?

12-month mental health problems
In the past 12 months have you experienced any *mental health problems* such as stress, anxiety or depression or worries about alcohol or drugs?

Have you sought any help or advice for any of these problems?

Table 1. Sample characteristics of ARMHS participants who completed the 3 year follow-up survey (n=1246)

Characteristic	N (%)
Age, mean (SD)	59.0 (13.3)
Gender (male)	486 (39.1)
Currently married/de facto	951 (76.8)
Perceived financial prosperity	
Prosperous/very comfortable	198 (16.0)
Reasonably comfortable	671 (54.2)
Just getting along/poor	368 (29.7)
Currently employed	707 (58.8)
Children in house	311 (26.9)
Caring for family member/friend	130 (10.6)
Suicidal ideation (past 2 weeks)	44 (3.6)
Remoteness	
Inner regional	551 (44.3)
Outer regional	423 (34.0)
Remote	179 (14.4)
Very remote	92 (7.4)
12-month MH problem	
No MH problem	862 (70.0)
MH problem without help-seeking	181 (14.7)
MH problem with help-seeking	188 (15.3)

Table 2. Distribution of internet access across geographical regions, % (n)

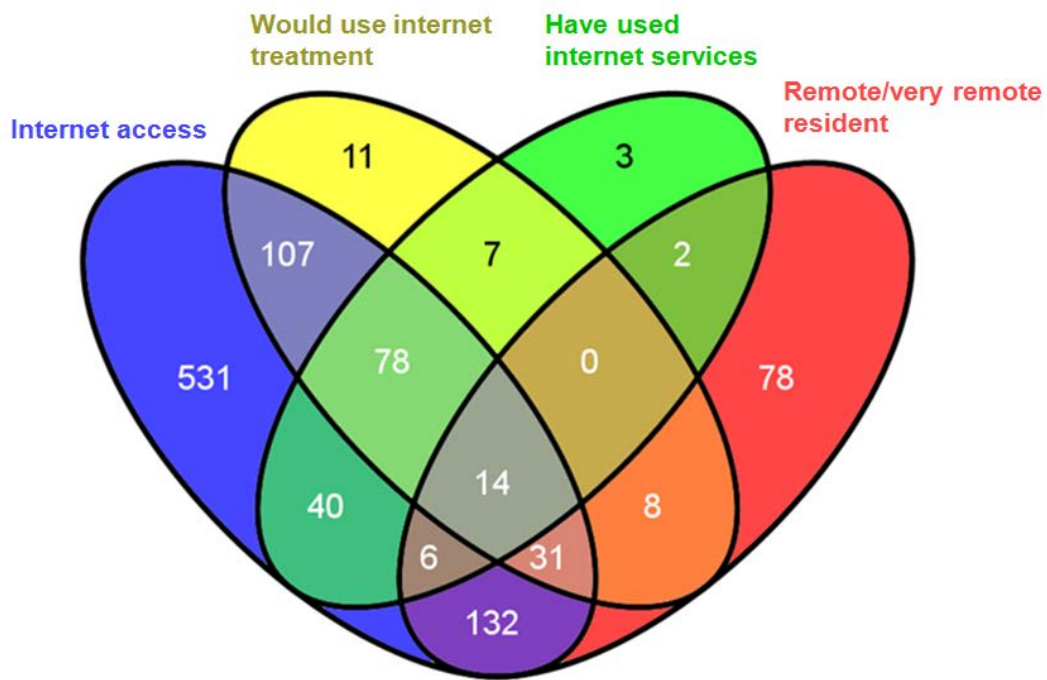|	Any internet	Dial-up internet	Broadband internet	ADSL internet	No internet
Inner regional	79.1 (436)	7.1 (38)	19.5 (104)	52.4 (279)	20.9 (111)
Outer regional	73.0 (309)	6.4 (26)	17.6 (71)	51.7 (209)	24.3 (98)
Remote	71.5 (128)	9.7 (17)	10.9 (19)	52.0 (91)	27.4 (48)
Very remote	59.8 (55)	2.4 (2)	20.7 (17)	42.7 (35)	34.1 (28)

Figure 1. Venn diagram displaying the relationship between having easy internet access, reporting a willingness to use internet-delivered mental health treatments, having used internet-delivered mental health services in the past, and residing in a remote or very remote area.

Table 3. Univariate (Odds Ratio, OR) and multivariate (Adjusted Odds Ratio, AOR) logistic regression models to predict feasibility of internet-delivered mental health treatments in a community based rural sample

Factor	OR (99%CI)	AOR (99%CI)
Age	0.96 (0.94-0.97)**	0.97 (0.95-0.99)**
Gender (male)	1.05 (0.78-1.41)	1.50 (1.05-2.14)*
Currently married/de facto	1.14 (0.80-1.62)	1.28 (0.82-2.00)
Perceived financial prosperity		
Prosperous/very comfortable	1.00	1.00
Reasonably comfortable	0.77 (0.52-1.14)	0.96 (0.60-1.52)
Just getting along/poor	0.68 (0.44-1.05)	0.69 (0.40-1.19)
Currently employed	2.35 (1.69-3.25)**	1.32 (0.86-2.03)
Children in house	2.68 (1.97-3.65)**	1.23 (0.79-1.90)
Caring for family member/friend	1.40 (0.90-2.16)	1.85 (1.10-3.13)*
Suicidal ideation	2.71 (1.44-5.09)**	1.31 (0.56-3.04)
Remoteness		
Inner regional	1.00	1.00
Outer regional	0.75 (0.54-1.05)	0.86 (0.58-1.27)
Remote	0.85 (0.55-1.32)	1.04 (0.62-1.74)
Very remote	0.65 (0.35-1.20)	0.84 (0.40-1.76)
12-month MH problem		
No MH problem	1.00	1.00
MH problem without help-seeking	2.54 (1.71-3.76)**	1.94 (1.23-3.05)**
MH problem with help-seeking	5.17 (3.62-7.38)**	3.03 (1.91-4.81)**
Used internet for MH information or treatment in the past	11.68 (8.00-17.06)**	6.01 (3.93-9.44)**

*$p < .05$, ** $p < .01$