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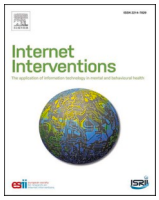

Acceptability and effectiveness study of therapist-assisted internet-delivered cognitive behaviour therapy for agriculture producers

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ABSTRACT

Agriculture producers are less likely to seek or to receive mental health services compared to the general population. Additional research is needed to identify effective and accessible mental health interventions for this underserved population. This study used a mixed-methods approach and open trial design to examine the acceptability and effectiveness of therapist-assisted internet-delivered cognitive behaviour therapy (ICBT) supplemented with an additional agricultural resource for clients from agricultural backgrounds receiving ICBT in routine care. Clients (n = 34) participated in an online, five-lesson course that provided psychoeducation and strategies for dealing with symptoms of anxiety and depression, with weekly therapist assistance. Clients also received a tailored resource (developed with input from those with an agricultural background) providing culturally specific information and case stories pertinent to agricultural communities. Intent-to-treat analyses showed that the ICBT program was effective in reducing anxiety and depression symptoms among the agricultural population. Large within-group pre-to-post-treatment Cohen's effect sizes of d = 1.14, 95 % CI [0.41, 1.86] and d = 1.15, 95 % CI [0.42, 1.87] were found for depression and anxiety, respectively and comparable to the same program offered to the general population. Clients also experienced reductions in perceived stress and significant improvements in resiliency from pre- to post-treatment. Semi-structured interviews conducted at post-treatment with the agricultural clients (n = 31) on their experiences with ICBT identified four main themes: perceived strengths of ICBT and the tailored resource, suggestions to improve service delivery for agriculture producers, clients experienced internal and external challenges to participating in ICBT, and the positive impact of the course reached beyond the client. Very high satisfaction rates were found. These results provide support for the acceptability and effectiveness of ICBT with a tailored resource offered in routine care among agriculture producers.

1. Introduction

Agriculture producers are vital for the global population's functioning and survival (Finnigan, 2019). Adopting the operational definition by Statistics Canada (2022), the term "agriculture producer" includes farmers, ranchers, and operators of all agricultural production types inclusive of all genders. Numerous factors contribute to increased stress levels for agriculture producers including occupational hazards (Fraser et al., 2005), limited work-life separation (Fraser et al., 2005), working with family members (Finnigan, 2019), long work hours and sleep deprivation (LaBrash et al., 2008), unpredictability of the weather and financial strain (Wilton Consulting Group, 2020), and the solitary nature of agricultural production (Yazd et al., 2019). Compounding these factors are psychiatric disorders, such as depression and anxiety, that further inhibit agriculture producers' ability to meet the increasing demands of their roles (Behere et al., 2020).

There are conflicting findings on rates of mental health disorders in the agricultural population compared to non-farmers (Chiswell, 2023). In a review of 48 papers, 54.0 % of the measures used to assess farmer mental health suggested that farmers' mental health is the same or better than non-farmers, although rates of suicide are higher among agricultural populations. Despite this, it has been identified that agriculture

Abbreviations: WC + AR, Wellbeing Course + Agricultural Resource; ICBT, Internet-delivered Cognitive Behaviour Therapy; OTU, Online Therapy Unit; WC, Wellbeing Course.

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producers are less likely to seek treatment for physical or mental health concerns compared to the general adult population (Brew et al., 2016; Finnigan, 2019). Agriculture producers report facing barriers to accessing treatment or support that include demanding work hours, cultural attitudes toward help-seeking, financial constraints, and limited availability of mental health supports (Brew et al., 2016; Finnigan, 2019; Jones-Bitton et al., 2019; Judd et al., 2006; Roy et al., 2014). An important factor that agriculture producers consider when seeking mental health support is whether the services and providers have "farm credibility", which is defined as understanding the unique needs and challenges associated with the agricultural lifestyle (Hagen et al., 2022). Farm credibility may play an important role in establishing therapeutic alliance within the agricultural population, which in turn can impact treatment engagement and outcomes.

To date, the literature on agriculture producers use of mental health services has predominantly focused on producers' preferences and barriers to receiving mental health care (Andrade et al., 2014; Brew et al., 2016; Cole and Bondy, 2020; Finnigan, 2019; Hagen et al., 2022; Judd et al., 2006; Roy et al., 2017; Vayro et al., 2020; Yazd et al., 2019). In order to help the population who feed us, it is also important to identify effective, evidence-based interventions that provide strategies for managing mental health and for coping with farm-related stress. Studies are needed that examine the acceptability and effectiveness of treatment modalities that meet the unique needs of agriculture producers while overcoming accessibility barriers.

Researchers outside of Canada have taken a step in this direction by examining internet-delivered mental health interventions for the agricultural population (Bowyer et al., 2023; Braun et al., 2021a, 2021b; Gunn et al., 2022) with each group taking a somewhat different approach. In Germany, a pragmatic RCT was used in a routine care setting to compare an internet-based intervention to treatment-as-usual to assist clients ($N = 360$) with prevention and treatment of subclinical to clinical levels of depression (Braun et al., 2021a, 2021b). In this sample, at baseline, 16.2 % had no depressive symptoms, 40.9 % mild symptoms, 30.9 % moderate symptoms and 12.1 % severe or very severe symptoms. Participants who received the internet-based intervention were assigned to an eCoach, who completed an assessment of each participant and then selected the most appropriate modules for the participant based on their presenting concerns (i.e., modules on depressive symptoms, depressive symptoms in comorbid diabetes mellitus, insomnia, perceived stress, panic/agoraphobia symptoms, and problematic drinking). At 9-week follow-up, 21.1 % of the participants had not completed the first assigned module, and overall, only 22.2 % of participants completed at least 80 % of the assigned modules. A small between-groups effect size was found in favour of the internet-based intervention in reducing symptoms of depression; within-group effects were not reported. Further, a reduced risk of onset of depression was found from baseline to 9-week follow-up in the intervention group. A strength of this study is that 6- and 12-month follow-up data was reported in a subsequent paper (Braun et al., 2021b). The internet-based intervention outperformed treatment-as-usual for reducing symptoms of depression at 6 months, but no significant difference was found at 12 months.

In Australia, researchers gathered input from agriculture producers to co-design a self-guided 5-module online intervention based on Acceptance and Commitment Therapy (Gunn et al., 2022). The majority of the sample (70.6 %) had low or mild levels of distress at baseline. In terms of completion rates, 37.1 % of participants who started the first module completed all 5 modules, 33.8 % completed post-treatment measures and 26.8 % completed 6-month follow-up measures. The most common reason for participants not completing all modules was that they were too busy (79.6 %). Among those completing post-treatment measures, most participants viewed the intervention content as acceptable overall, with mean acceptability ratings ranging from 3.49 to 4.25 out of 5 on each of the modules. A strength of the study was that it included participant follow-up interviews to assess the usability and acceptability of the prototype, which informed iterative design changes; moreover, the authors examined the effectiveness of the intervention at post-treatment and 6-month follow-up (Gunn et al., 2023). In terms of effects among those who completed questionnaires, the researchers found that there were significant improvements in psychological distress and mental wellbeing from baseline to post-treatment, with changes maintained at 6-month follow-up.

More recently, researchers in Scotland modified a computerized Cognitive Behavioural Therapy (cCBT) program to tailor the content to address farming issues (Bowyer et al., 2023). In this feasibility trial, members of the farming community were offered a course with automated and personalized weekly support that included five modules with content focused on building life skills related to emotional awareness, behavioural activation, problem thinking and problem-solving, and relaxation. The majority of participants scored in the non-clinical range on measures of depression and anxiety at pre-treatment. Of the 56 participants accepted into the trial, 35 logged into the intervention, and 15 completed post-treatment measures. Course completion was low, with 14 % (5/35) of those who logged into the course completing all 5 modules. Among those who completed questionnaires, researchers found significant decreases in symptoms of anxiety, but not depression, from pre-treatment to post-treatment. Post-intervention interviews suggested that participants appreciated the content of the course, the frequency of email support (weekly), and the convenience of email support.

A common finding from the research conducted with agriculture producers in Germany, Australia, and Scotland is that, among those who provide post-treatment data, internet-delivered interventions are an acceptable method of treatment delivery and appear effective for some agriculture producers with mental health concerns. Program completion rates were somewhat low, which could be related to lower symptom severity in the samples. In the case of Gunn et al. (2022), the low completion rates may also be a reflection of a self-guided intervention as compared to guided (Musiat et al., 2022). A common finding was that there are challenges that agriculture producers experience which impact intervention engagement and completion, such as heavy workloads and stigma (Bowyer et al., 2023; Braun et al., 2021a; Gunn et al., 2022).

To contribute to the literature showing internet-delivered interventions are promising for improving access to treatment for some agriculture producers, the current study explored the extent to which therapist-assisted Internet-delivered cognitive behaviour therapy (ICBT), offered with a tailored resource, is effective for agriculture producers receiving ICBT as part of routine care. Similar to the above studies, the focus was on offering agriculture producers an internet-based intervention to address common mental health concerns. This study expands on the existing research by examining the effectiveness of offering an additional resource alongside therapist-assisted ICBT delivered in routine care, in a sample in which the majority of participants scored above the clinical cut-off for symptoms of depression and anxiety. Such information can help inform if this approach to tailoring ICBT to agriculture producers is beneficial in routine care. ICBT is known to be effective for treating a variety of mental health disorders (Andersson et al., 2019; Hedman-Lagerlöf et al., 2023), with increasing reports of therapist-assisted ICBT being available as part of routine care in various parts of the world (Etzelmueller et al., 2020). In a routine care setting, it is important to strike a balance between providing treatment that addresses the specific needs of populations, such as agriculture producers, while ensuring that service delivery is feasible and sustainable. It is neither realistic nor economically viable to create and deliver treatment courses specific to every conceivable population or mental health condition. However, one way to accomplish this is by providing a tailored resource alongside an existing ICBT program to meet the unique needs of different populations.

In Canada, there is an established routine care setting that is funded by the Saskatchewan Ministry of Health to deliver a transdiagnostic ICBT program to residents, free of charge (Hadjistavropoulos et al.,

2016). Variations of the course have been offered with content tailored to address specific populations, for example, anxiety and depression among post-partum mothers (Suchan et al., 2022), or among individuals post spinal cord injury (Mehta et al., 2019). Using a pre-existing ICBT course with the agricultural population that is funded by provincial government meets the need of cost-effective mental health care. It is necessary, however, to examine the acceptability and effectiveness of the course with a tailored resource with the agricultural population. Designing a tailored resource with agriculture producer input that illustrates how ICBT materials can be applied to the agricultural lifestyle may satisfy the farm credibility factor (Hagen et al., 2022), or the perceived need for therapist support from someone with farming knowledge (Bowyer et al., 2023).

The current study examined whether clients in a therapist-assisted transdiagnostic ICBT course with a tailored resource (developed with input from individuals with an agricultural background) experience a change in symptoms of depression and anxiety, a change in perceived stress, and an increase in resiliency. A further objective was to examine agricultural clients' engagement with the ICBT course to explore if issues of adherence described above generalize to other programs. Finally, we were interested in examining agriculture producers' perceptions of the acceptability of the ICBT course and their perceived barriers to treatment, engagement, and completion. It was hypothesized that agricultural clients would experience significant improvements in depression, anxiety, perceived stress, and resiliency. No specific hypotheses were made regarding client engagement or perceptions about the acceptability of the ICBT course.

2. Method

2.1. Participants and recruitment

Prospective clients learned about the Online Therapy Unit and this specific study within the unit through social media postings (i.e., Facebook, Twitter), information shared at agriculture conferences and events, posters in rural communities, media interviews, and newsletters distributed by agriculture organizations in Saskatchewan. All clients in the current study started by applying for ICBT through the Online Therapy Unit website (www.onlinetherapyuser.ca). Institutional ethics approval was secured (REB #: 2019-197). Fig. 1 highlights participant flow in the study.

2.1.1. Sample size

A power analysis (G*Power 3; Faul et al., 2007) was calculated to allow for a medium effect size of 0.50, an alpha of 0.05, and a power level of 0.80 when examining changes from pre-treatment to post-treatment. The recommended sample size was 27 participants, which was increased to 34 participants to allow for a 25 % drop-out rate, based on previous research within the same province (Hadjistavropoulos et al., 2020b).

2.1.2. Eligibility criteria

Clients were eligible to participate if they declared in their screening that they: (a) were at least 18 years old; (b) were residents of Saskatchewan involved in agriculture (i.e., active or retired from farming, partner to a producer, helping a producer, or employee of a producer); (c) reported any symptoms of anxiety and/or depression (see measures below); (d) had secure access to the internet; and (e) understood English. Additionally, clients had to provide consent for ICBT and for participating in a follow-up interview. Clients were excluded from ICBT if they: (a) had high risk of suicide; (b) severe alcohol or drug problems; (c) had unmanaged mania or psychosis; or (d) were receiving mental health services from another provider more than twice per month. Clients with high risk of suicide or unmanaged mania or psychosis were referred to their medical providers for client safety. Clients with severe alcohol or drug problems were either enrolled in an ICBT course specifically treating substance misuse or referred to an addictions service.

2.2. Measures

Demographic variables were collected at pre-treatment. Primary and secondary outcome measures were administered at pre- and post-treatment. Questions about treatment satisfaction and semi-structured interviews (with clients and therapists) were administered at post-treatment.

2.2.1. Demographics

Client demographic information collected included: age, gender, marital status, employment type(s), agricultural involvement, education, ethnicity, community size, psychotropic medication use, mental health condition history, and mental health treatment sought.

2.2.2. Primary outcome measures

Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001). The PHQ-9 is a 9-item validated self-report questionnaire that assesses the severity of depression-related symptoms during the previous two weeks. Each item is rated on a scale from 0 to 3, with total scores ranging from 0 to 27, and higher scores being associated with more severe symptoms (Kroenke et al., 2001). Scores of 10 or more on the PHQ-9 suggest a potential diagnosis of major depressive disorder (Manea et al., 2012), however, it should be noted that recent studies indicate higher cut-offs may be appropriate (Titov and Andersson, 2022). Cronbach's alpha for the PHQ-9 in this study ranged from 0.85 to 0.86.

Generalized Anxiety Disorder (GAD-7; Spitzer et al., 2006). The GAD-7 is 7-item validated self-report questionnaire that measures symptoms of generalized anxiety during the previous two weeks. Items are rated on a scale ranging from 0 to 3, with total scores ranging from 0 to 21. Scores of 8 or higher suggest clinically significant symptoms of anxiety (Spitzer et al., 2006). Cronbach's alpha for the GAD-7 ranged from 0.86 to 0.90.

2.2.3. Secondary outcome measures

Perceived Stress Scale (PSS; Cohen et al., 1983). The PSS is a 10-item self-report questionnaire that measures three aspects of an individual's perceived stress during the past month (i.e., how uncontrollable, overloaded, and unpredictable their life has been). Each item is rated on a scale from 0 to 4, for a total score ranging between 0 and 40, and higher scores indicating greater levels of perceived stress. Cronbach's alpha for the PSS ranged from 0.86 to 0.92.

Connor-Davidson Resilience Scale (CD-RISC-10; Connor and Davidson, 2003). The CD-RISC-10 consists of 10 items rated on a scale of 0 to 4 that measure resilience (i.e., one's ability to cope with stress). Higher scores represent greater self-reported resilience. Cronbach's alpha for the CD-RISC-10 ranged from 0.90 to 0.95.

2.3. Treatment satisfaction and interviews

To broadly assess acceptability, we had clients complete treatment satisfaction questions. Clients responded to "*Yes*" or "*No*" questions about whether the treatment was worth their time and whether they would recommend the treatment to a friend. Clients also responded to questions about treatment satisfaction on a 5-point Likert scale (i.e., satisfaction with the overall treatment, with treatment platform, and with the quality of the content and treatment materials). Further, clients rated their confidence in managing their symptoms following treatment and motivation to seek further treatment if needed in the future on a 5-point Likert scale.

Participants were invited for a post-treatment interview consisting of 15 open-ended questions that, after learning more about the client's background, focused on assessing acceptability of the Wellbeing Course and Agricultural Resource (WC + AR). Clients were asked about their experiences with and perceptions of the WC + AR and therapist support,

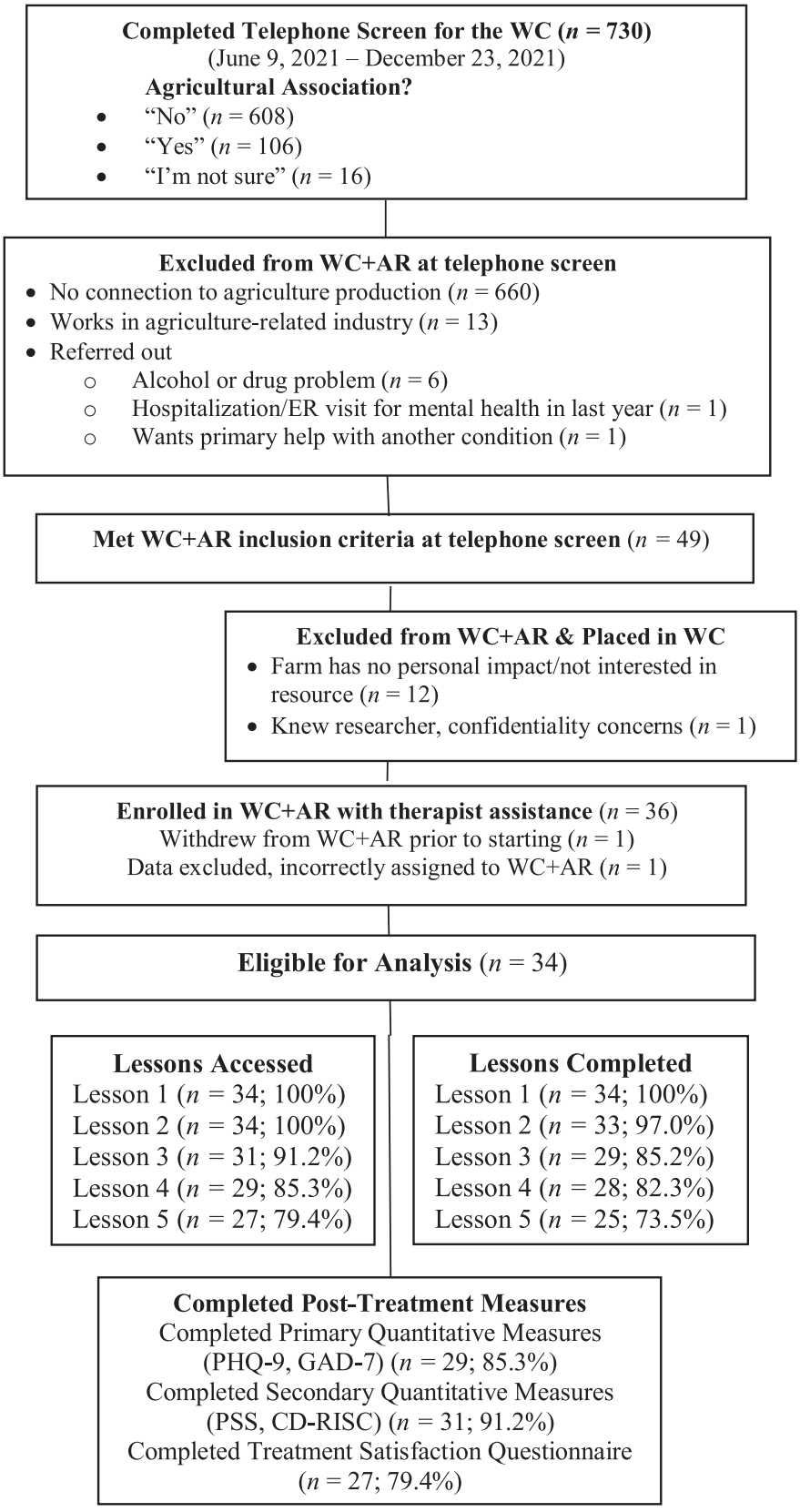

Fig. 1. Client flow from screening to post-treatment.
Note. WC = Wellbeing Course; WC + AR = Wellbeing Course and Agricultural Resource; PHQ-9 = Patient Health Questionnaire-9; GAD-7 = Generalized Anxiety Disorder-7; PSS = Perceived Stress Scale; CD-RISC = Connor Davidson Resilience Scale.

perceptions of barriers to their participation, and areas for improvement. To understand farming credibility, one question asked participants about whether they ever felt they had to explain the farming lifestyle to the therapist and if the information they were given throughout the program fit with their lifestyle.

2.4. Intervention

2.4.1. The wellbeing course and agricultural resource (WC + AR)

Clients in this study received a five lesson ICBT course, called the *Wellbeing Course* (WC; Titov et al., 2015), which has been found more effective than waitlist control (Terides et al., 2018; Titov et al., 2013) and has been implemented and validated in the general population in Australia and the Canadian province of Saskatchewan (Dear et al., 2015a, 2015b; Fogliati, 2016; Hadjistavropoulos et al., 2016, 2017; Hadjistavropoulos et al., 2019; Titov et al., 2015). Lessons included content based on CBT principles and included (1) the CBT model and symptom identification; (2) thought monitoring and challenging; (3) strategies for managing hyper- and hypo-arousal; (4) graded exposure; and (5) relapse prevention. Lessons are presented in a slideshow format and include psychoeducation, client stories, and downloadable 'Do-It-Yourself' guides that include lesson summaries and worksheets. Clients also had access throughout the treatment period to additional resources that provided skill building and information on various topics that addressed agricultural mental health, managing alcohol use, balancing new motherhood, COVID-19 case stories, assertiveness, communication skills, emergency contacts, managing beliefs, mental skills, managing panic attacks, managing PTSD, good sleep guide, managing anger, managing health anxiety, structured problem solving, workplace management, and building motivation. During the course, clients received automated reminder emails plus weekly emails from their assigned therapist (see below for further details).

The Agricultural Resource (AR) was created specifically for this trial. The content of the resource is based upon research conducted with the Canadian farming population (e.g., Finnigan, 2019; Wilton Consulting Group, 2020) and feedback shared by agricultural clients who previously participated in Online Therapy Unit programs. The resource begins with information about the prevalence of stress and common mental health problems in Canadian farmers, as well as the importance of maintaining good mental health within agriculture. Subsequent sections of the resource are intended to map onto the content of each of the five lessons and include information about: common unhelpful thoughts, physical sensations, and unhelpful behaviours in anxiety and depression; thought challenging; controlled breathing and activity scheduling; graded exposure; managing setbacks and relapse prevention; and a summary of the resource. Central to the resource is the presentation of two case stories (i.e., a female rancher who is also employed off farm and a male grain farmer who is supposed to take over the farm from his parents) to illustrate how the content of the WC can be applied to the management of agricultural stressors. The resource was drafted by the primary researcher who is an agriculture producer and then reviewed by research unit staff with an agricultural or rural background, a previous agricultural client who completed an ICBT program offered by the Online Therapy Unit, and the creators of the WC. Feedback was integrated into a revised version of the resource.

2.4.2. Therapist support

All clients were offered once-weekly therapist support via secure messaging and therapists sent a message to clients each week, regardless of whether the client had initiated communication. Clients could message their therapist at any time during the course, but therapists only responded to messages on a designated day each week. Given that the therapists did not have an agricultural background, the primary investigator (C.B.) was available to answer agriculture-related questions that therapists had. Therapists were encouraged to include the following in each message to clients: convey warmth/concern, engage clients with course material and reinforce progress, highlight content from lessons, provide feedback on weekly symptom measures, answer client questions, manage risk, remind clients of lesson/course timelines, and inform clients about the day of their next check-in (Hadjistavropoulos et al., 2018). Phone calls were made to clients when clinically indicated (i.e., increase of at least five points on weekly PHQ-9 or GAD-7, increased suicide risk, or based on the content of messages from the client, or if the client had not logged onto the treatment platform for at least 7 days) to ensure client safety.

2.5. Data analysis

Data were analyzed using IBM SPSS Statistics (Version 27.0). Descriptive statistics were computed to examine pre-treatment demographic and clinical characteristics and treatment completion and satisfaction. There were 14.7 % (5/34) and 8.8 % (3/31) missing values in the primary and secondary outcome measures, respectively, at post-treatment. The analysis of missingness with Little's Missing Completely at Random test ($\chi^2 = 286.55$, $df = 268$, $p = .21$) suggested that the data were missing at random (Little and Rubin, 2002). Although mixed-model procedure with maximum likelihood method can handle missing data (Shin et al., 2017; Twisk et al., 2013), following the intention-to-treat principle, the missing data on primary and secondary outcome measures were imputed using the multiple imputation method, generating 30 multiply imputed datasets so that the data from all eligible clients were included in the analysis (Enders, 2010; Graham et al., 2007). Fig. 1 provides a summary of the percentage of post-treatment measures that were completed.

A series of mixed model analyses were conducted using all data available across the nine weekly assessments to examine changes in the PHQ-9 and GAD-7 outcomes over the course of treatment. For each outcome, a series of models involving fixed and random effects of intercept and slope (time) were conducted. The models with smallest Akaike's Information Criterion and Bayesian Information Criterion were selected for the final analysis. Final models used AR (1) within-individual covariance structure. Estimates were calculated using the full information maximum likelihood method. Pooled results are presented for all mixed-model analyses. Pre- to post-treatment effect sizes (Cohen's *d*) were computed using estimated means and standard deviations from the mixed-model analysis.

Reliable improvement, recovery, and deterioration were examined to assess for clinically significant changes in symptom scores. Consistent with previous ICBT research (Dear et al., 2015a, 2015b; Titov et al., 2020; Hadjistavropoulos et al., 2021), reliable improvement was defined as scoring $\geq$ 10 on the PHQ-9 or $\geq$8 on the GAD-7 at pre-treatment and scoring at least 6 points on the PHQ-9 or 5 points on the GAD-7 lower at post-treatment. Reliable deterioration was defined as an increase from pre- to post-treatment of 6 points on the PHQ-9 or 5 points on the GAD-7. Reliable recovery was defined as scoring $\geq$10 on the PHQ-9 or $\geq$ 8 on the GAD-7 at pre-treatment and experiencing a reliable improvement to the non-clinical range (<10 on PHQ-9 and <8 on GAD-7) (Dear et al., 2015a, 2015b; Titov et al., 2020). Secondary outcome measures (i.e., PSS and CD-RISC) were only administered at pre-treatment and post-treatment, so changes were analyzed using paired-sample *t*-tests.

Two coders (CB and TP) were involved in the analysis of all interview transcripts. Responses to the semi-structured interviews were transcribed and both coders reviewed the transcriptions for accuracy and to remove any identifying information. Coders noted initial impressions during the data familiarization process, met to discuss their impressions, and systematically generated initial codes. Responses were analyzed using reflexive thematic analysis from a realist epistemology (Braun and Clarke, 2006, 2021; Byrne, 2021), guided by Braun and Clarke (2006) six steps for thematic analysis. The objective of using this approach was to reflect the reality of the agriculture population's experiences with engaging in ICBT. Data was analyzed at the semantic level (i.e., based on

what the client said, rather than looking for meaning) using NVivo software and the coding process was collaborative and reflexive. Decisions about whether or not to include a theme were based on whether the element helped to address the research questions or captured the experiences of clients. The coding process was collaborative and consensus coding was used, with both CB and TP coding all of the interviews.

3. Results

3.1. Client characteristics at pre-treatment

Table 1 outlines the pre-treatment demographic and clinical characteristics of clients who received the WC + AR. The majority of clients identified as female (23/34, 67.6 %), White (32/34, 94.1 %), married (25/34, 73.5 %), had children (23/34, 67.6 %), and reported living on a farm (20/34, 58.8 %). Further, the majority of clients scored above the clinical cut-off for depression (21/34, 61.8 %) and anxiety (26/34, 76.5 %), with 23.5 % (8/34) scoring above the cut-off for both. Information gathered through the semi-structured interviews regarding farm involvement highlighted that 61.8 % ($n = 21$) of participants identified as a producer, and eight (23.5 %) reported not identifying as a producer but as the spouse of a producer who helps with farm labour, financially, and emotionally. One participant helped financially and emotionally, but not with farm labour. Four participants did not self-identify as an agriculture producer, but rather the adult children of an agriculture producer whom return to help on the farm during evenings, weekends, and holidays. These individuals reported living in a city to attend post-secondary education within proximity of the farm. Producers also reported living in rural or urban locations, which is a trend identified across Canadian agriculture (Statistics Canada, 2023).

3.2. Symptom scores

3.2.1. Primary outcomes

A mixed-model analysis of the primary outcome measures revealed that clients experienced statistically significant reductions in symptoms of depression ($\beta_1 = -0.67$, 95 % $CI = [-0.89, -0.45]$, $p < .001$) and anxiety ($\beta_1 = -0.62$, 95 % $CI = [-0.80, -0.45]$, $p < .001$) from pre- to post-treatment. Fig. 2 shows the mean change on anxiety and depression symptoms over the course of treatment. A large effect size was found for reductions in symptoms of depression ($d = 1.14$, 95 % CI [0.41, 1.86]) and anxiety ($d = 1.15$, 95 % CI [0.42, 1.87]).

3.2.2. Reliable change

At post-treatment, 26.5 % (9/34) and 38.2 % (13/34) of clients achieved reliable recovery on the PHQ-9 and GAD-7, respectively. Further, 35.3 % (12/34) and 47.1 % (16/34) of clients achieved reliable improvement on the PHQ-9 and GAD-7. Three clients (8.8 %) reported no change on the GAD-7 and only one client (2.9 %) experienced deterioration on the PHQ-9.

3.2.3. Secondary outcomes

A paired sample *t*-test was performed to evaluate whether there was a statistically significant difference between the pre-treatment and post-treatment assessments on secondary outcomes. The results showed that there was a significant decrease in PSS mean scores from pre-treatment ($M = 23.18$, $SD = 6.16$) to post-treatment ($M = 18.37$, $SD = 6.16$), $t_{33} = 5.21$, $p < .001$ Likewise, there was a significant increase in CD-RISC-10 mean scores from pre-treatment ($M = 21.09$, $SD = 6.87$) to post-treatment ($M = 24.97$, $SD = 6.13$), $t_{33} = -4.64$, $p < .001$.

3.3. Treatment completion and satisfaction

Of the 34 clients who started the WC + AR, 100 % accessed lessons 1 and 2, 91.2 % (31/34) accessed lesson 3, 85.3 % (29/34) accessed lesson 4, and 79.4 % (27/34) accessed lesson 5. The treatment satisfaction questionnaire was completed by 79.41 % (27/34) of clients. The majority of clients indicated that they were either satisfied or very satisfied with the overall treatment (92.59 %, 25/27), with the treatment platform (96.30 %, 25/27), and with the quality of the lessons and DIY guides (92.59 %, 25/27). All clients (100 %, 27/27) indicated that the

Table 1
Client Characteristics at Pre-Treatment.

Variable	All clients ($n = 34$)	
	n	%
Age		
Mean (*SD*)	39.29 (11.44)	–
Range	18–63	–
Gender		
Female	23	67.6
Male	10	29.4
Prefer not to disclose	1	2.9
Ethnicity		
White	32	94.1
Indigenous, Métis	1	2.9
Prefer not to disclose	1	2.9
Marital status		
Married/common law	25	73.5
Single, divorced, widowed	9	26.5
Children		
Yes	23	67.6
No	11	32.4
Education		
High school or less	9	26.5
Some college/university	6	17.6
College or university degree	16	47.1
Professional/graduate degree	3	8.9
Location		
Farm	20	58.8
Rural town (<7000)	8	23.5
Small city (7000–20,000)	2	5.9
City (over 20,000)	4	11.8
Referral source		
Mental health professional or health region intake	11	32.4
Physician or medical professional	9	26.5
Personal connection (friend/family/employer/colleague)	7	20.6
Online, media, or poster	6	17.6
Other	1	2.9
Mental health characteristics		
Lifetime mental health service use	31	91.2
Lifetime medication use for mental health	19	55.9
Current medication use for mental health concerns	14	41.2
Currently receiving mental health treatment	11	32.4
Current mental health service use		
Family doctor	7	20.6
Psychiatrist	4	11.8
Psychologist	2	5.9
Social worker	1	2.9
Duration of depression concerns		
0–6 months	6	17.2
7–12 months	7	20.0
>1 year	22	62.9
Duration of anxiety concerns		
0–6 months	6	17.2
7–12 months	7	20.0
>1 year	22	62.9
Above clinical cut-off		
PHQ-9 ≥ 10	21	61.8
GAD-7 ≥ 8	26	76.5
PHQ-9 ≥ 10 and GAD-7 ≥ 8	8	23.5
Pre-treatment symptom scores	Mean	*(SD)*
PHQ-9	11.76	6.36
GAD-7	10.71	5.35
PSS	23.18	6.16
CD-RISC	21.09	6.88

Note. PHQ-9 = Patient Health Questionnaire-9; GAD-7 = Generalized Anxiety Disorder-7; PSS = Perceived Stress Scale; CD-RISC = Connor Davidson Resilience Scale.

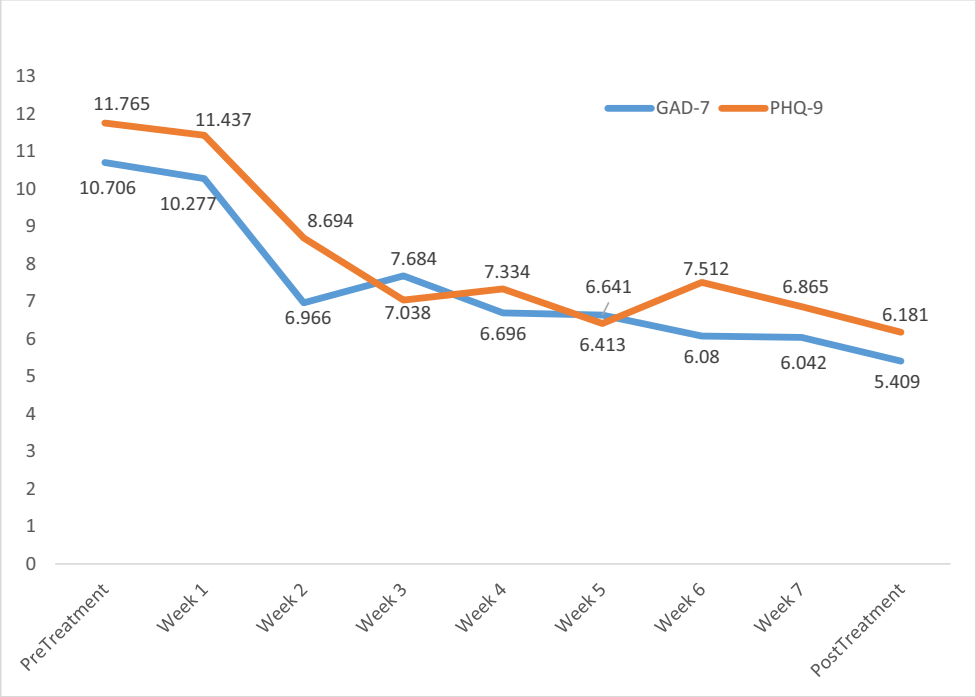

Fig. 2. Mean change on anxiety and depression symptoms over the course of treatment. GAD-7 = Generalized Anxiety Disorder −7 item; PHQ-9 = Patient Health Questionnaire - 9 item.

treatment was worth their time and that they would feel confident recommending the treatment to a friend.

3.4. Qualitative analyses

Four themes were identified from clients' responses in the semi-structured interviews, of which 31 clients participated: 1) strengths of ICBT and the Agricultural Mental Health resource facilitated participation; 2) suggested improvements for service delivery; 3) internal and external challenges to participating in ICBT; and 4) the positive impact of the course reached beyond the client.

3.4.1. The strengths of ICBT and the AR facilitated participation

All 31 (100 %) clients commented on aspects of ICBT that reduced barriers to receiving mental health care. Clients spoke about how ICBT helped overcome external barriers such as financial constraints, wait times, and traveling to appointments. ICBT was described as accessible (e.g., clients with limited computer literacy found the platform easy to use) and convenient from a technological perspective (e.g., ability to access the website on a laptop, tablet, or cellular phone). Clients also reported that ICBT helped overcome internal barriers such as stigma and concerns of anonymity, confidentiality, and judgment in seeking mental health support.

Another aspect that every client commented on was the perceived credibility of the therapists and how clients felt they did not need to explain their agricultural lifestyle to their therapist (e.g., "He seemed to understand, and I didn't feel any need to explain anything to him" [Client 23]). Clients also reported the cultural appropriateness of the AR was a strength that facilitated participation, in that it addressed agricultural stressors and lifestyle factors. 100 % of clients stated the examples and case stories in the resource were relatable, albeit, one female agriculture producer additionally felt the case stories were stereotypical. More broadly, clients described how the quality and quantity of information covered in the ICBT course was helpful and appreciated the psycho-education about symptoms of anxiety and low mood, as well as gaining tools for managing mental health challenges (e.g., "It's just so helpful and like my example, I was considering antidepressants because I know that's a tool. Now I got another tool in my toolbox and it works super well, and I don't even need the antidepressants now" [Client 29]).

3.4.2. Suggested improvements for service delivery

Twelve (39 %) participants indicated that there were no improvements needed. Among clients who offered suggestions for improving service delivery, comments were primarily focused on having alternative delivery formats (i.e., podcasts or video versions in addition to text files) and alternative therapist support options (i.e., ability to speak with a therapist by telephone, increased email frequency, meeting with a therapist via video, or peer support with other clients). Other suggestions included streamlining the WC + AR to contain the AR information and removing examples that did not pertain to agriculture. Clients also offered suggestions about website features that could ease navigation, such as the ability to "bookmark" their progress in the course and to embed hyperlinks for additional resources within the lessons. Other comments pertained to the appropriateness of the AR based on the client's primary concerns (e.g., 7 clients reported that their concerns were not agriculture related), difficulties engaging due to other mental or physical health challenges (i.e., attention deficit/hyperactivity disorder), or clients feeling they did not identify as agriculture producers because they were not the primary decision-makers (e.g., "I shied away from it a little bit. I felt kind of nervous, like I wasn't involved enough in the farming life or agriculture life" [Client 31]).

3.4.3. Internal and external challenges to participating in ICBT

Internal challenges to participating in ICBT included: mistrust of the Internet; not knowing which websites are reliable for mental health support; low motivation, procrastination, or distractions that served as barriers to engaging with the course while on the computer; difficulty reading/focusing, and personal preferences to speak with a therapist via telephone instead of by email. 100 % of clients reported experiencing external challenges to participating that included time constraints, managing different roles and responsibilities, and prioritizing farm labour or family needs over ICBT.

3.4.4. The positive impact of the course reached beyond the client

Clients ($n = 31$, 100 %) described learning new skills from the course that helped them understand and manage agricultural stressors and mental health concerns. Clients reported that their involvement in the course had a positive impact that extended beyond themselves to their families (e.g., "It helps our entire family unit" [Client 2]) or employees (e.g., "....it seemed like they thought you were more approachable with the skills you were using, and then the way that you handled various situations at various times" [Client 23]). Clients also reported that they recommended the course to friends, family members, or co-workers. Among clients who did not identify as producers, they reported that the AR contributed to their understanding of and compassion for producers in their lives. Additional comments from clients focused on: how their participation in the course reduced their fears and increased their confidence in seeking additional mental health support in the future, words of encouragement for other producers seeking support, and the importance of participating in the course during a less busy farming period (e.g., during the winter or outside of harvest season).

4. Discussion

Agriculture producers are less likely to access and receive mental health support compared to the general population (Brew et al., 2016; Judd et al., 2006), and there is a need for effective and accessible mental healthcare options for this population (Finnigan, 2019; Fraser et al., 2005; Vayro et al., 2020; Wilton Consulting Group, 2020). ICBT has potential but a challenge is that these courses are often generic to meet the needs of a broad population. Moreover, the research conducted with the agricultural population examining internet-delivered mental health interventions has identified challenges with engagement and retention (Bowyer et al., 2023; Braun et al., 2021a, 2021b; Gunn et al., 2022), as well as client reports of limited time as a barrier to treatment engagement (Bowyer et al., 2023; Gunn et al., 2022). The objective of the current study was to examine the effectiveness and acceptability of a therapist-assisted ICBT program offered in routine care that included a resource tailored to agriculture producers. Primary outcomes included changes in symptoms of anxiety and depression. Secondary outcomes included changes in perceived stress and resilience, as well as a mixed-methods examination of treatment satisfaction.

As predicted, clients who received ICBT experienced significant, large reductions in symptoms of depression ($d = 1.14$, 95 % CI [0.41, 1.86]) and anxiety ($d = 1.15$, 95 % CI [0.42, 1.87]). In comparing symptom outcomes for the agriculture population in this study to those reported in the literature, a direct comparison is difficult given differences in samples, interventions, treatment completion rates, and questionnaire completion rates. For example, previous studies have combined outcomes among "green professions" (i.e., agriculture, forestry, and horticulture) with clients offered one or more modules based on an initial assessment (Braun et al., 2021ab) and reported outcomes relative to a control condition, have examined self-guided programs based on ACT (e.g., Gunn et al., 2022), or have included clients with minimal or no symptoms of depression or anxiety as part of their sample (e.g., Bowyer et al., 2023). In general, the effects in the current study appear to be larger than those previously reported (e.g., Bowyer et al., 2023), but this may reflect that clients in the current study had more severe symptoms at pre-treatment. Further, differences in treatment adherence between the current study and past studies may have contributed to differences in effect sizes. For example, 85.3 % (29/34) of clients in the WC + AR completed at least 80 % of the lessons, whereas only 22.2 % of clients in the Braun et al. (2021a) completed at least 80 % of the intervention modules. Similarly, Gunn et al. (2022) reported 37.1 % of participants who started the first module completed all 5 modules and Bowyer et al. (2023) reported only 14 % completed all modules. Overall, while further direct comparative research is needed, the findings suggest that different approaches to working with agriculture producers with different symptom levels are likely to result in different levels of treatment engagement. For clinics who deliver therapist-assisted ICBT, offering an additional AR may be a feasible method of tailoring treatment to agriculture producers.

A promising finding was that clients in the WC + AR reported improvements in symptoms of depression and anxiety that were similar in magnitude to studies of the WC at the same routine care clinic. In an observational study of 4283 clients accepted into the WC over the span of 6 years, Hadjistavropoulos et al. (2022) reported similarly large effect sizes of $g = 1.01$ (95 % CI [0.97, 1.05]) and $g = 1.19$ (95 % CI [0.97, 1.05]) for improvements in depression and anxiety from pre-treatment to post-treatment. Further, rates of reliable recovery on the PHQ-9 (WC + AR: 26.5 %; WC: 36.3 %) and GAD-7 (WC + AR: 38.2 %; WC: 45.0 %) were similar between the current sample of WC + AR clients and the previous study of WC clients (79.4 % versus 70.4 %). These findings suggest that clients with agricultural backgrounds can experience similar benefits as non-agricultural clients when enrolled in a transdiagnostic ICBT course that includes a resource tailored to an agricultural population.

Clients in the WC + AR also reported statistically significant improvements in perceived stress and resiliency, with large effect sizes. These findings are promising given that high levels of perceived stress can contribute to mental health concerns, and resilience acts as a protective factor in the agriculture population (Jones-Bitton et al., 2019). Previous studies have examined between-group differences in changes in perceived stress (e.g., Braun et al., 2021a), however, they did not report within-group effect sizes. To our knowledge, previous studies of internet-based interventions for agricultural populations have not examined changes in resiliency. Thus, the findings of the current study with regards to changes in perceived stress and resiliency cannot be compared to the literature.

In addition to the promising findings regarding improvements in depression, anxiety, perceived stress, and resiliency, clients reported a number of strengths that highlight the acceptability of the WC + AR. Similar to participants who expressed high satisfaction with internet interventions for agriculture producers at post-treatment in studies by Braun et al. (2021a, 2021b), Gunn et al. (2022), and Bowyer et al. (2023), clients in the current study found the WC + AR to be highly acceptable with 100 % of clients indicating they would refer a friend to the program. Clients commented on the WC + AR overcoming barriers that agriculture producers typically encounter when seeking mental health support (e.g., accessibility; concerns about stigma, anonymity, and confidentiality; scheduling; cost and time constraints), as well as the cultural appropriateness of the AR. When reflecting on barriers or challenges experienced during the course, clients expressed a desire for alternative delivery options (e.g., podcasts or audio clips) and additional therapist contact options (e.g., telephone check-ins or more frequent contact). Nevertheless, it should be noted that previous studies of ICBT have found that offering telephone check-ins are associated with implementation challenges, including requiring clients to make time during their day to schedule a synchronous phone call (Hadjistavropoulos et al., 2021) and that more frequent contact beyond once weekly contact (e.g., response within one business day; Hadjistavropoulos et al., 2020a) does not result in better outcomes. Although, these options for therapist support have not been examined in a sample of agriculture producers.

4.1. Study strengths

This study had strengths that contribute to the literature on ICBT for agriculture producers. Use of a mixed-methods approach allowed for a richer understanding of a research area in which the literature is limited on the use of ICBT with agriculture producers in routine care settings. The inclusion of a resource tailored to the context and culture of agriculture producers is a further strength, as it ensured that clients could relate the core CBT strategies to their unique cultural context. To our knowledge, this is the first study to show that therapists who delivered

ICBT with an AR were perceived to have farm credibility, which addresses a concern among agriculture producers seeking mental health care.

4.2. Study limitations and future directions

The findings of this study should be considered in light of several limitations. Overall, the small sample size limited quantitative data analysis and there was no control group of agriculture producers who did not have access to the AR. Four of the 29 (13.8 %) clients who completed the post-treatment measures did not complete all five lessons of the course, which limits the conclusions we can make regarding the impact of course completion on symptom reductions. The study did not include a longitudinal design to identify the duration of treatment effects. Further, all clients were from one province within Canada enrolled in one ICBT program, so the results may not be generalizable to agriculture populations in other provinces or countries. The majority of clients reported accessing mental health supports at some point during their lifetime (31/34, 91.2 %). It is likely that clients within this sample were open to seeking mental health support, which may not be representative of the broader agriculture population. To address these limitations, future studies could include the following: a larger sample size, a control group of agriculture producers who receive the standard ICBT course without the AR, process measures to understand changes in clients' thinking and behaviour over time, and clients from other geographical locations. Further, additional efforts should be made to ensure that ICBT is accessed by clients who have less comfort with accessing mental health supports.

Clients offered feedback about how to improve the course (e.g., video, audio files, telephone contact with therapists, peer support, streamlining the resource). While the suggestions present interesting directions for future research, it is noteworthy that moderate to large effects were found for symptom reduction in the current study, and that further modifications might not be necessary.

5. Conclusion

As hypothesized, clients in the WC + AR experienced significant reductions in anxiety and depression and significant improvements in perceived stress and resiliency. Including an additional resource tailored to agriculture producers appears to improve “farm credibility” and to be an effective and acceptable way to address this population's needs in transdiagnostic ICBT, without the need for a fully tailored ICBT course. Further, clients reported high rates of satisfaction and identified several strengths of the ICBT course in terms of cultural appropriateness, course content, and the perceived credibility of therapists. The promising findings from this study suggest that future research should focus on implementation efforts to aid in greater awareness and adoption of transdiagnostic ICBT with an AR within this population.

Declaration of competing interest

None.

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References

Andersson, G., Carlbring, P., Titov, N., Lindefors, N., 2019. Internet interventions for adults with anxiety and mood disorders: a narrative umbrella review of recent meta-analyses. Can. J. Psychiatr. 64 (7), 465–470. https://doi.org/10.1177/0706537193839381.

Andrade, L.H., Alonso, J., Mneimneh, Z., Wells, J.E., Al-Hamzawi, A., Borges, G., Bromet, E., Bruffaerts, R., de Girolamo, G., de Graaf, R., Florescu, S., Gureje, O., Hinkov, H.R., Hu, C., Huang, Y., Hwang, I., Jin, R., Karam, E.G., Kovess-Masfety, V., Kessler, R.C., 2014. Barriers to mental health treatment: results from the WHO World Mental Health Surveys. Psychol. Med. 44 (6), 1303–1317. https://doi.org/10.1017/S0033291713001943.

Behere, P.B., Mansharamani, H., Behere, A.P., Yadav, R., 2020. Suicide and self-harms in rural retting: with special reference to farmers' suicide. In: Mental Health and Illness in the Rural World, 151-167. https://doi.org/10.1007/978-981-10-2345-3_21.

Bowyer, H.L., Pegler, R., Williams, C., 2023. Computerized cognitive behavioral therapy for anxiety and depression in farming communities: mixed methods feasibility study of participant use and acceptability. JMIR Form. Res. 7, e42573 https://doi.org/10.2196/42573.

Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. Qual. Res. Psychol. 3, 77–101. https://doi.org/10.1101/1478088706qp063oa.

Braun, V., Clarke, V., 2021. One size fits all? What counts as quality practice in (reflexive) thematic analysis? Qual. Res. Psychol. 18 (3), 325–352. https://doi.org/10.1080/14780887.2020.1769238.

Braun, L., Titzler, I., Terhorst, Y., Freund, J., Thielecke, J., Ebert, D.D., Baumeister, H., 2021a. Effectiveness of guided internet-based interventions in the indicated prevention of depression in green professions (PROD-A): results of a pragmatic randomized controlled trial. J. Affect. Disord. 278, 658–671. https://doi.org/10.1016/j.jad.2020.09.066.

Braun, L., Titzler, I., Terhorst, Y., Freund, J., Thielecke, J., Ebert, D.D., Baumeister, H., 2021b. Are guided internet-based interventions for the indicated prevention of depression in green professions effective in the long run? Longitudinal analysis of the 6- and 12-month follow-up of a pragmatic randomized controlled trial (PROD-A). Internet Interv. 26, 100455 https://doi.org/10.1016/j.invent.2021.100455.

Brew, B., Inder, K., Allen, J., Thomas, M., Kelly, B., 2016. The health and wellbeing of Australian farmers: a longitudinal cohort study. BMC Public Health 16, 988. https://doi.org/10.1186/s12889-016-3664-y.

Byrne, D., 2021. A worked example of Braun and Clarke's approach to reflexive thematic analysis. Qual. Quant. 56, 1391–1412. https://doi.org/10.1007/s11135-021-01182-y.

Chiswell, H., 2023. Psychological morbidity in the farming community: a literature review. J. Agromed. 28 (2), 156–176. https://doi.org/10.1080/1059924X.2089419.

Cohen, S., Kamarck, T., Mermelstein, R., 1983. A global measure of perceived stress. J. Health Soc. Behav. 24 (4), 385–396. https://doi.org/10.2307/2136404.

Cole, D.C., Bondy, M.C., 2020. Meetings farmers where they are – rural clinicians' views on farmers' mental health. J. Agromed. 25 (1), 126–134. https://doi.org/10.1080/1059924X.2019.1659201.

Connor, K.M., Davidson, J.R.T., 2003. Development of a new resilience scale: the Connor-Davidson resilience scale (SC-RISC). Depress. Anxiety 18, 76–82. https://doi.org/10.1002/da.10113.

Dear, B.F., Staples, L.G., Terides, M.D., Karin, E., Zou, J., Johnston, L., Gandy, M., Fogliati, V.J., Wootton, B.M., McEvoy, P.M., Titov, N., 2015a. Transdiagnostic versus disorder-specific and clinician-guided versus self-guided internet-delivered treatment for generalized anxiety disorder and comorbid diseases: a randomized controlled trial. J. Anxiety Disord. 36, 63–77. https://doi.org/10.1016/j.janx.dis.2015.09.003.

Dear, B.F., Zou, J.B., Ali, S., Lorian, C.N., Johnston, L., Sheehan, J., Staples, L.G., Gandy, M., Fogliati, V.J., Klein, B., Titov, N., 2015b. Clinical and cost-effectiveness of therapist-guided internet-delivered cognitive behavior therapy for older adults with symptoms of anxiety: a randomized controlled trial. Behav. Ther. 46, 206–217. https://doi.org/10.1016/j.beth.2014.09.007.

Enders, C.K., 2010. Applied Missing Data Analysis. Guilford Press.

Etzelmueller, A., Vis, C., Karyotaki, E., Baumeister, H., Titov, N., Berking, M., Cuijpers, P, Riper, H., Ebert, D.D., 2020. Effects of internet-based cognitive behavioral therapy in routine care for adults in treatment for depression and anxiety: systematic review and meta-analysis. J. Med. Internet Res. 22 (8), e18100 https://doi.org/10.2196/18100.

Faul, F., Erdfelder, E., Lang, A., Buchner, A., 2007. GPower 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behav. Res. Methods 39 (2), 175–191. https://doi.org/10.3758/BF03193146.

Finnigan, P., 2019. Mental health: a priority for our farmers. In: Report of the Standing Committee on Agriculture and Agri-food. https://epe.lac-bac.gc.ca/003/008/099/003008-disclaimer.html?orig=/100/201/301/weekly_acquisitions_list-ef/2019/19-22/publications.gc.ca/collections/collection_2019/parl/xc12-1/XC12-1-1-421-16-eng.pdf.

Fogliati, V.J., 2016. Disorder-specific versus transdiagnostic and clinician-guided versus self-guided internet-delivered treatment for panic disorder and comorbid disorders: a randomized controlled trial. J. Anxiety Disord. 39, 88–102. https://doi.org/10.1016/j.janxdis.2016.03.005.

Fraser, C.E., Smith, K.B., Judd, F., Humphreys, J.S., Fragar, L.J., Henderson, A., 2005. Farming and mental health problems and mental illness. Int. J. Soc. Psychiatry 51 (4), 340–349. https://doi.org/10.1177/0020764005060844.

Graham, J.W., Olchowski, A.E., Gilreath, T.D., 2007. How many imputations are really needed? Some practical clarifications of multiple imputation theory. Prev. Sci. 8 (3), 206–213. https://doi.org/10.1007/s11131-007-0070-9.

Gunn, K.M., Skaczkowski, G., Dollman, J., Vincent, A.D., Short, C.E., Brumby, S., Barrett, A., Harrison, N., Turnbull, D., 2022. Combining farmers' preference with evidence-based strategies to prevent and lower farmers' distress: co-design and acceptability testing of ifarmwell. JMIR Hum. Factors 9 (1), e27631. https://doi.org/10.2196/27631.

Gunn, K.M., Skaczkowski, G., Dollman, J., Vincent, A.D., Brumby, S., Short, C.E., Turnbull, D., 2023. A self-help online intervention is associated with reduced distress and improved mental wellbeing in Australian farmers: the evaluation and key mechanisms of www.ifarmwell.com.au. J. Agromed. 28 (3), 378–392. https://doi.org/10.1080/1059924X.2022.2156642.

Hadjistavropoulos, H.D., Nugent, M.M., Alberts, N.M., Staples, L., Dear, B.F., Titov, N., 2016. Transdiagnostic Internet-delivered cognitive behaviour therapy in Canada: an open trial comparing results of a specialized online clinic and nonspecialized community clinics. J. Anxiety Disord. 42, 19–29 (doi:10/1016/j.janxdis.2016.05.006).

Hadjistavropoulos, H.D., Schneider, L.H., Edmonds, M., Karin, E., Nugent, M.N., Dirkse, D., Dear, B.F., Titov, N., 2017. Randomized controlled trial of internet-delivered cognitive behaviour therapy comparing standard weekly versus optional weekly therapist support. J. Anxiety Disord. 52, 15–24. https://doi.org/10.1016/j.janxdis.2017.09.006.

Hadjistavropoulos, H.D., Schneider, L.H., Klassen, K., Dear, B.F., Titov, N., 2018. Development and evaluation of a scale assessing therapist fidelity to guidelines for delivering therapist-assisted Internet-delivered cognitive behaviour therapy. Cogn. Behav. Ther. 47 (6), 447–461. https://doi.org/10.1080/16506073.2018.1457079.

Hadjistavropoulos, H.D., Schneider, L.H., Mehta, S., Karin, E., Dear, B.F., Titov, N., 2019. Preference trial of internet-delivered cognitive behaviour therapy comparing standard weekly versus optional weekly therapyist support. J. Anxiety Disord. 63, 51–60. https://doi.org/10.1016/j.janxdis.2019.02.002.

Hadjistavropoulos, H.D., Peynenburg, V., Nugent, M., Karin, E., Titov, N., Dear, B.F., 2020a. Transdiagnostic Internet-delivered cognitive behaviour therapy with therapist support offered once-weekly or once-weekly supplemented with therapist support within one-business-day: pragmatic randomized controlled trial. Internet Interv. 22, 100347 https://doi.org/10.1016/j.invent.2020.100347.

Hadjistavropoulos, H.D., Peynenburg, V., Thiessen, D.L., Nugent, M., Adlam, K., Owens, K.M.B., Karin, E., Dear, B.F., Titov, N., 2020b. A pragmatic factorial randomized controlled trial of transdiagnostic internet-delivered cognitive behavioural therapy: exploring benefits of homework reflection questionnaires and twice-weekly therapist support. Internet Interv. 22, 100357 https://doi.org/10.1016/j.invent.2020.100357.

Hadjistavropoulos, H.D., Peynenburg, V., Thiessen, D., Schneider, L.H., Nugent, M., Wilhelms, A., Karin, E., Titov, N., Dear, B.F., 2021. Five-year observational study of Internet-delivered cognitive behavioural pain management when offered as routine care by an online therapy clinic. Eur. J. Pain 26 (2), 390–404. https://doi.org/10.1002/ejp.1886.

Hadjistavropoulos, H.D., Peynenburg, V., Thiessen, D.L., Nugent, M., Karin, E., Staples, L., Dear, B.F., Titov, N., 2022. Utilization, patient characteristics, and longitudinal improvements among patients from a provincially funded transdiagnostic internet-delivered cognitive behavioural therapy program: observational study of trends over 6 years. Can. J. Psychiatr. 67 (3), 192–206. https://doi.org/10.1177/07067437211006873.

Hagen, B.N.M., Sawatzky, A., Harper, S.L., O'Sullivan, T., Jones-Bitton, A., 2022. "Farmers aren't into the emotions and things, right?": a qualitative exploration of motivations and barriers for mental health help-seeking among Canadian farmers. J. Agromed. 27 (2), 113–123. https://doi.org/10.1080/1059924X.2021.1893884.

Hedman-Lagerlöf, E., Carlbring, P., Svärdman, F., Riper, H., Cuijpers, P., Andersson, G., 2023. Therapist-supported Internet-based cognitive beahviour therapy yields similar effects as face-to-face therapy for psychiatric and somatic disorders: an updated systematic review and meta-analysis. World Psychiatry 22 (2), 305–314. https://doi.org/10.1002/wps.21088.

Jones-Bitton, A., Best, C., MacTavish, J., Fleming, S., Hoy, S., 2019. Stress, anxiety, depression, and resilience in Canadian farmers. Soc. Psychiatry Psychiatr. Epidemiol. 55 (2), 229–236. https://doi.org/10.1007/s00127-019-01738-2.

Judd, F., Jackson, H., Komiti, A., Murray, G., Fraser, C., Grieve, A., Gomez, R., 2006. Help seeking by rural residents for mental health problems: the importance of agrarian values. Aust. N. Z. J. Psychiatry 40, 769–776. https://doi.org/10.1080/j.1440-1614.2006.01882.x.

Kroenke, K., Spitzer, R.L., Williams, J.B., 2001. The PHQ-9: validity of a brief depression severity measure. J. Gen. Intern. Med. 16, 606–613. https://doi.org/10.1046/j.1525-1497.2001.016009606.x.

LaBrash, L.F., Pahwa, P., Pickett, W., Hagel, L.M., Snodgrass, P.R., Dosman, J.A., 2008. Relationship between sleep loss and economic worry among farmers: a survey of 94 active Saskatchewan noncorporate farms. J. Agromed. 13 (3), 149–154. https://doi.org/10.1080/10599240802371862.

Little, R.J.A., Rubin, D.B., 2002. Statistical Analysis with Missing Data. John Wiley & Sons, Inc. https://doi.org/10.1002/9781119013563

Manea, L., Gilbody, S., McMillan, D., 2012. Optimal cut-off score for diagnosing depression with the Patient Health Questionnaire (PHQ-9): a meta-analysis. Can. Med. Assoc. J. 184 (3), 191–196. https://doi.org/10.1503/cmaj.110829.

Mehta, S., Hadjistavropoulos, H.D., Earis, D., Titov, N., Dear, B.F., 2019. Patient perspectives of Internet-delivered cognitive behavior therapy for pychosocial issues post spinal cord injury. Rehabil. Psychol. 64 (3), 351–359. https://doi.org/10.1037/rep0000276.

Musiat, P., Johnson, C., Atkinson, M., Wilksch, S., Wade, T., 2022. Impact of guidance on intervention adherence in computerised interventions for mental health problems: a meta-analysis. Psychol. Med. 52 (2), 229–240. https://doi.org/10.1017/S0033291721004621.

Roy, P., Tremblay, G., Robertson, S., 2014. Help-seeking among male farmers: connecting masculinities and mental health. Sociol. Rural. 54 (4), 460–476. https://doi.org/10.1111/soru.12045.

Roy, P., Tremblay, G., Robertson, S., Houle, J., 2017. "Do it all by myself": a salutogenic approach of masculine health practice among farming men coping with stress. Am. J. Mens Health 11 (5), 1536–1546. https://doi.org/10.1177/1557988315619677.

Shin, T., Davison, M.L., Dong, J.D., 2017. Maximum likelihood versus multiple imputation for missing data in small longitudinal samples with nonnormality. Psychol. Methods 22 (3), 426–449. https://doi.org/10.1037/met0000094.

Spitzer, R.L., Kroenke, K., Williams, J.B., Löwe, B., 2006. A brief measure for assessing generalized anxiety disorder: the GAD-7. Arch. Intern. Med. 166 (10), 1092–1097. https://doi.org/10.1001/archinte.166.10.1092.

Statistics Canada, 2022, May 11. Farms classified by operating arrangement. In: 2021 Census of Agriculture. https://www150.statcan.gov.ca/t1tb11/en/tv.action?pid=3210023501.

Statistics Canada, 2023, August 25. The socioeconomic snapshot of Canada's evolving farm population, 2021. https://www150.statcan.gc.ca/n1/daily-quotidien/230825/dq230825a-eng.htm.

Suchan, V., Peynenburg, V., Thiessen, D., Nugent, M., Dear, B., Titov, N., Hadjistavropoulos, H., 2022. Transdiagnostic intervent-delivered cognitive behavioral therapy for symptoms of postpartum anxiety and depression: feasibility randomized controlled trial. JMIR Form. Res. 6 (9), e37216 https://doi.org/10.2196/37216.

Terides, M.D., Dear, B.F., Fogliati, V.J., Gandy, M., Karin, E., Jones, M.P., Titov, N., 2018. Increased skills usage statistically mediates symptom reduction in self-guided internet-delivered cognitive-behavioural therapy for depression and anxiety: a randomised controlled trial. Cogn. Behav. Ther. 47 (1), 43–61. https://doi.org/10.1080/16506073.2017.1347195.

Titov, N., Andersson, G., 2022. Using brief measures to identify depression and other mental disorders: a challenge for research and clinical practice. Internet Interv. 28, 100450 https://doi.org/10.1016/j.invent.2021.100450.

Titov, N., Dear, B.F., Johnston, L., Lorian, C., Zou, J., Wootton, B., Spence, J., McEvoy, P. M., Rapee, R.M., 2013. Improving adherence and clinical outcomes in self-guided internet treatment for anxiety and depression: randomised controlled trial. PLoS One 8 (7), e62873. https://doi.org/10.1371/journal.pone.0062873.

Titov, N., Dear, B.F., Staples, L.G., Terides, M.D., Karin, E., Sheean, J., Johnston, L., Gandy, M., Fogliati, V.J., Wootton, B.M., McEvoy, P.M., 2015. Disorder-specific versus transdiagnostic and clinician-guided versus self-guided treatment for major depressive disorder and comorbid anxiety disorders: a randomized controlled trial. J. Anxiety Disord. 35, 88–102. https://doi.org/10.1016/j.janxdis.2015.08.002.

Titov, N., Dear, B.F., Nielssen, O., Wootton, B., Kayrouz, R., Karin, E., Genest, B., Bennett-Levy, J., Purtell, C., Bezuidenhout, G., Tan, R., Minissale, C., Thadhani, P., Webb, N., Willcock, S., Anderrson, G., Hadjistavropoulos, H.D., Mohr, D.C., Kavanagh, D.J., Staples, L.G., 2020. User characteristics and outcomes from a national digital mental health service: an observational study of registrants of the Australian MindSpot Clinic. Lancet Digit. Health 2 (11), 582–593. https://doi.org/10.1016/S2589-7500(20)30224-7.

Twisk, J., de Boer, M., de Vente, W., Heymans, M., 2013. Multiple imputation of missing values was not necessary before performing a longitudinal mixed-model analysis. J. Clin. Epidemiol. 66 (9), 1022–1028. https://doi.org/10.1016/j.jclinepi.2013.03.017.

Vayro, C., Brownlow, C., Ireland, M., March, S., 2020. "Don't … break down on Tuesday because the mental health services are only in town on Thursday": a qualitative study of service provision related barriers to, and facilitators of farmers' mental health help-seeking. Adm. Policy Ment. Health Ment. Health Serv. Res. https://doi.org/10.1007/s10488-020-01085-4.

Wilton Consulting Group, 2020. Healthy Minds, Healthy Farms. Exploring the connection between mental health and farm business management, Commissioned by Farm Management Canada. https://fmc-gac.com/healthymindshealthyfarms/.

Yazd, S.D., Wheeler, S.A., Zuo, A., 2019. Key risk factors affecting farmers' mental health: a systematic review. Int. J. Environ. Res. Public Health 16 (4849). https://doi.org/10.3390/ijerph16234849.