Research

Impact of an automated Internet-based cognitive behavioral therapy program on suicide thinking and risk among United States rural adults

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Received: 12 October 2021 / Accepted: 7 February 2022

Published online: 03 March 2022

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Abstract

Cognitive behavior therapy (CBT) is an evidence-based psychotherapy for mental disorders, including depression. Internet-based CBT (iCBT) programs increasingly are showing similar impact to clinician-delivered CBT. We assessed the impact of Thrive, a fully-automated iCBT depression treatment program on suicidal thinking. Participants were randomly assigned to the intervention (INT) group ($n = 218$) or a waitlist control group (WLC, $n = 230$). Intent-to-treat analyses tested for group differences at 8-weeks in suicidal thinking (CHRT-SR₃ subscale, primary outcome), and secondary outcomes including depression symptoms (PHQ-9), anxiety symptoms (GAD-7), work and social adjustment (WSAS), and resilience (CD-RISC-10). Using self-reports, participants were evaluated at baseline, 4 and 8 weeks for each outcome. Thrive program adherence ($n = 218$) was assessed by number of lessons completed. Although not statistically significant, the INT group was 38.7% less likely than the control group to present with suicidal thinking at 8 weeks (odds ratio 0.61, $p = 0.10$). Comparison of 8-week depression symptom slopes showed statistically significant effects favoring the INT group (WLC = -3.04 vs Thrive = -4.32 , $p = 0.007$) ($d = 0.08$); no other significant group differences were observed. Lessons completed were significantly related to lower PHQ-9 ($p = 0.026$) and GAD-7 scores ($p < 0.01$). Study results are consistent with a previous study showing nonsignificant effect of an automated iCBT program for reducing suicidal thinking, but a significant positive impact on depression symptoms among rural US adults. Future studies should test whether strategies for boosting lesson completion are successful in enhancing the efficacy of Thrive to reduce suicide risk.

Trial Registration: National Institutes of Health Trial ID: NCT03595254.

Keywords Internet-based cognitive behavior therapy · Suicide risk · Depressive symptoms · Rural populations · Effectiveness trial

1 Introduction

Epidemiologic studies have consistently found greater suicide prevalence and trends of increasing suicide rates among US rural populations compared to urban populations [1–9]. Data from 2008 to 2018 show age-adjusted suicide rates growing faster in rural areas compared to urban areas with an increase of 48% compared to 34% [8]. Hence, there is a need to address risk factors for rural US adults.

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Research has identified a number of factors placing rural communities at greater suicide risk, including greater geographic or social isolation, economic strain, access to lethal means such as guns, and long distances to and/or limited availability of mental health treatment resources compared to urban or suburban communities [10]. In the US, Western mountain states have been labeled the “suicide belt”, with higher suicide rates compared to other states [11]. The vast majority of communities in these states are rural and have significantly greater barriers to accessing mental health care, including stigma, cost, and inability to schedule appointments. For example, in Montana, more than 50% of counties do not have a psychologist; over 65% do not have a psychiatrist [12]. Other universal barriers including stigma, cost, and inability to schedule appointments are also present [13]. Yet, the need for care is comparably greater in Montana, given the state’s higher depression prevalence than the national rate (24.1% vs 19.7%) [14] and its long-term consistent top three ranking of states with the highest suicide rates in the nation [15].

Given greater barriers to care, novel solutions are needed to address suicide risk in rural communities. One recommendation is to disseminate Internet-based psychoeducation programs [16]. Internet-based programs that teach Cognitive Behavior Therapy (iCBT) skills have emerged as evidence-based solutions to address depression and anxiety symptoms [17]. Fully-automated versions of iCBT programs (those not requiring human support) have the additional advantage of partially addressing the enduring shortage of mental health care providers [18].

Currently, most iCBT studies have been conducted outside of the US [19]. This study is one of two randomized clinical trials (RCT) evaluating a culturally adapted iCBT program called “Thrive” with rural US adults [20]. The Thrive program draws upon evidence-based CBT principles designed to reduce depression symptoms. The first Thrive trial with 343 adults demonstrated at 8-weeks significant and clinically meaningful reductions in depression and anxiety symptoms (effect sizes $d = 0.63$ and 0.47 , respectively) in the intervention (INT) group compared to the waitlist control (WLC) group [21]. Furthermore, longitudinal analyses showed that these improvements were sustained for 12 months [22]. The present study builds upon and extends this earlier work with the primary aim to assess the impact of the Thrive intervention on suicidal thinking as the primary outcome measure by measuring suicidal thinking (rather than depressive symptoms) as the primary outcome. A second aim was to assess the relationship between program adherence and outcomes. Based on our prior research, we hypothesized that participants in the INT group would show significantly great reductions in suicide risk (primary outcome) and in depression and anxiety symptoms (secondary outcomes).“

2 Methods

2.1 Trial design

We used a randomized controlled trial (RCT) design, randomly assigning participants to immediate Thrive program access (INT group) vs 8-week delayed access to Thrive (WLC group). Potential participants were provided with a link to the study website, consented electronically, and presented with the same assessment battery at study entry (baseline), 4- and 8-weeks. Study eligibility criteria included being at least age 18 years, Montana residency, a score of ≥ 5 on the Patient Health Questionnaire (PHQ)-9 [23], and having access to a device (computer, tablet, or smart phone) with broadband Internet. Compared to the first trial, the current study provided more modest incentives for research participation (\$10 vs \$25 with the first trial) for each completed follow-up assessments. The study protocol was approved by the Institutional Review Board of Montana State University. The trial was registered at [nihtrials.gov](https://clinicaltrials.gov): NCT03595254.

2.2 Participants

Participants included adults aged 18 years and over (mean age = 42.7) with residence in the state of Montana. Over 80% were female and nearly 90% were White (see Table 1). Nearly three quarters resided in designated rural parts of the state. Over 50% of participants reported having a bachelor’s or higher degree; nearly 60% reported receiving some form of mental health treatment at baseline.

2.3 Procedure

Participants for the study were recruited between November 2018 and April 2020 using presentations to health care providers, flyers, posters, social media advertisements, and state Extension agents. Of 1102 individuals assessed for eligibility, 729 were deemed eligible and consented to participate. A simple computer auto-generated program was used to randomize 366 INT group participants and 363 WLC group participants. The analytic sample was further reduced by eliminating those who either: (1) were deemed fake participants (we refer readers to the first Thrive RCT publication [21] for details concerning identification of fake participants), (2) entered invalid email addresses, (3) reflected duplicate participation or entered an invalid date of birth, or (4) did not complete the suicide risk baseline assessment. The final analytic sample included 218 INT group and 230 WLC group participants (see Fig. 1). All participants were told to keep receiving the care that they were currently using.

2.4 Intervention description

Thrive is a fully automated intervention for depression based on CBT principles and techniques, including cognitive restructuring, behavioral activation, and social skills training [24]. These CBT themes are captured in each module (Constructive Thinking, Rewarding Activities, and Assertive Communication) with each module containing 10 lessons and suggested exercises for users to practice off-line as homework pertinent to their own self-identified goals. Thrive uses videos, interactive tools, and sophisticated algorithms that dynamically adjust the individual's use of the intervention, including a suite of 320 videos that explain CBT concepts, demonstrate skills, and present case histories of individuals who used CBT skills to improve depression symptoms. The program also features periodic PHQ-9 self-assessments, followed

Fig. 1 Study consort flow chart. “Improper group allocation” occurred via an automated randomization glitch

Fig. 2 Eight-week trend comparisons of suicidal thinking. Suicidal risk as measured using 3 items of the 7-item Concise Health Risk Tracking Self-Report [25, 26]. *INT Group* immediate Thrive intervention group; *WLC Group* waitlist control group

by tailored feedback based on the scores. Over a third of the demonstration and case history videos were replaced with new videos featuring rural characters, story lines, and settings; all other features of the Thrive program (i.e., didactic videos, interactive tools, and algorithms) were unchanged.

2.5 Study instruments

2.5.1 Demographic variables

Participant demographic information included age (years), gender (female vs male), race (White vs other), marital status (married/domestic relationship vs all other statuses), employment status (employed full-time/part-time/student vs unemployed/retired), educational attainment (some college without a degree, bachelor's degree, master's degree or higher), and rural classification (urban vs large rural/small rural/isolated). Participants' addresses (zip codes) were used to determine 10 rural–urban commuting area (RUCA) codes which classify US census tracts based on population density, urbanization, and daily community (USDA Economic Research Service, 2020). These codes were further collapsed into 4 codes: urban, large rural, small rural, and isolated. Participants also self-reported whether they were receiving any care or taking medication(s) for mental health treatment.

2.5.2 Primary outcome measure

The primary outcome measure was the 3-item Suicidal Thinking subscale (CHRT₃) of the 7-item Concise Health Risk Tracking Self-Report (score range: 3–15, higher scores indicate greater suicidal thinking in the past 2 weeks; Cronbach Alpha = 0.80) [25, 26]. The measure's three items were combined and dichotomized to form a binary outcome measure of suicidal thinking (agreement/disagreement). The three items are: "I have been having thoughts of killing myself", "I have thoughts about how I might kill myself," and "I have a plan to kill myself. An "agree" or "strongly agree" response on any of the three items indicated presence of suicidal thinking (coded as 1). Participants who self-reported neither agree nor disagree, disagree, or strongly disagree on all 3 items indicated an absence of suicidal thinking (coded as 0).

2.5.3 Secondary outcome measures

Pre-specified secondary outcomes included: depression symptom severity, measured using the 9-item Patient Health Questionnaire (PHQ-9; score range: 0–27; higher scores indicate greater frequency of symptoms in the past 2 weeks) [23]; anxiety symptom severity, measured with the Generalized Anxiety Disorder Scale (GADS-7; score range: 0–21; higher scores indicate greater frequency of symptoms in the past 2 weeks) [27, 28]; daily functioning, using the Work and Social Adjustment Scale (WSAS; score range: 0–40; higher scores indicate a greater adverse impact of depression on daily functioning) [29]; and resilience, as measured by the Conner-Davidson Resilience Scale (CD-RISC-10; score range: 0–40; higher scores indicate greater resilience) [30].

2.6 Data analyses

The dichotomized primary outcome variable was modeled using a logistic regression model within a Generalized Estimating Equation (GEE) framework with repeated measures to compare the INT and WLC groups suicidal risk over time [31]. This model contained fixed-effects terms for treatment, time (baseline, week 4, week 8), treatment $\times$ time interaction, and the baseline mean suicidal thinking score as a covariate. For easier interpretation of the treatment effect, odds ratios were estimated as part of the binary logistic model. The change over 8 weeks in the for each continuous secondary outcome measures was compared between the INT and WLC groups using a linear mixed model analysis of repeated measures [21]. All models contained fixed-effects terms for treatment, time (baseline, week 4, week 8), treatment $\times$ time interaction, and the respective baseline mean score for each outcome (prior to the intervention) as a covariate. For better interpretation of the treatment effect, the least squares mean (adjusted treatment mean scores) were estimated as part of each mixed model. Rates of remission and relapse were assessed longitudinally for the INT group using the PHQ-9. Remission was defined as a treatment response in which an individual with mild, moderate, moderately severe, or severe depression at baseline (PHQ-9 scores ≥ 5) achieved a subsequent PHQ-9 score lower than 5 at 4 weeks and/or 8 weeks. Relapse was defined as a PHQ-9 score ≥ 10 for those who had achieved remission at 4 weeks.

Analyses of Thrive program adherence (INT group only) were completed by assessing the longitudinal change over time in the outcomes to assess the relationship with lessons completed in the program. Using separate logistic regression models for the primary outcome and linear mixed models with repeated measures for secondary outcomes, the adherence measure (lessons completed) was assessed at baseline, 4 weeks, and 8 weeks for each outcome [22]. All models contained fixed-effects terms for the lessons completed, time (baseline, week 4, week 8), and respective baseline outcome measure as a covariate. Statistical analyses were performed using SAS software (Version 9.4, SAS Institute, Inc., Cary, North Carolina). Maximum likelihood estimators allow efficient parameter estimation using only available data under an assumption of missing at random [32–34]. The level of significance was set at $\alpha = 0.05$ (two-tailed). Bonferroni adjustments were assessed to ensure the 95% confidence intervals for the point estimates of treatment group effects matched the significance levels in the corresponding test. A priori evaluable sample size for a statistical power of 80% was estimated (enrollment of $n = 99$ per group).

3 Results

3.1 Treatment outcomes

Table 2 presents the longitudinal mean 8-week trends for the primary outcome. Suicidal ideation was reported by 28.1%, 17.6%, and 12.3% of participants at baseline, week 4, and week 8, respectively. The predicted odds of elevated suicidal risk (CHRT-SR₃) for the intervention group showed a steeper decline from baseline to week 8 than that of the control group but this difference failed to reach statistical significance; the INT group was 38% less likely than the WLC group to present with suicidal thinking following the entire 8-week follow-up period (see Fig. 2).

Table 3 presents the longitudinal mean 8-week trends for each secondary outcome. We found a statistically significant depression severity slope showing contrasts favoring the INT group. No significant between-group slopes were observed for the remaining secondary outcomes.

All INT group participants began the study with a PHQ-9 score of 5 or above ($n = 218$). A large majority (77.1%) had moderate or greater depression symptom severity (i.e., PHQ-9 scores ≥ 10 , $n = 168$). For those with follow-up data ($n = 79$),

Table 1 Study sample baseline characteristics

Study group	Total sample		WLC group		INT group	
Characteristics	n = 448		n = 230		n = 218	
Age, mean (SD)	42.7	(13.7)	43.5	(13.3)	41.9	(14.1)
	n	(%)	n	(%)	n	(%)
Baseline suicidal thinking ^a	126	(28.1)	54	(23.5)	72	(33.0)
Female (n* = 15)	360	(83.1)	183	(82.4)	177	(83.9)
Race (n* = 18)						
White	385	(89.5)	199	(90.1)	186	(89.0)
All others ^b	45	(10.5)	22	(10.0)	23	(11.0)
Marital status (n* = 11)						
Married/domestic partnership	237	(54.2)	128	(56.6)	109	(51.7)
All other statuses	200	(45.8)	98	(43.4)	102	(51.7)
Employment status (n* = 11)						
Employed full/part-time/student	351	(80.3)	185	(81.9)	166	(78.7)
Unemployed/retired	86	(19.7)	41	(18.1)	45	(21.3)
Education (n* = 11)						
Associate degree, some college or less	213	(48.7)	98	(43.4)	115	(54.5)
Bachelor's degree	141	(32.3)	75	(33.2)	66	(31.3)
Master's degree or higher	83	(19.0)	53	(23.5)	30	(14.2)
Rural classification ^c	328	(73.2)	174	(75.7)	154	(70.6)
Receiving mental health treatment ^d (n* = 11)	260	(59.5)	128	(56.6)	132	(62.6)

WLC waitlist control; INT intervention; n* number missing

^aSuicidal thinking (Items 5, 6 and 7) on the Concise Health Risk Tracking Scale-Self Report 7-Item (CHRT-SR₇) was compared between the two groups (INT vs WLC) as agreement (presence) with suicidal risk (yes/no)

^bOther race included AI/AN, Hispanic, Asian, Black/African American, Native Hawaiian/Other Pacific Islander, Some other race or origin

^cDefined using RUCA (rural urban commuting area) codes. Includes only rural residents (codes 2–4)

^dReceiving any care or taking medication(s) for mental health treatment

Table 2 Effect of Thrive intervention on CHRT-SR₇ suicidal thinking at each timepoint and overall

	Odds of suicidal risk at week 4				Odds of suicidal risk at week 8				Overall odds of suicidal risk ^d			
	OR ^a	95% CI ^c	Z-statistic	p-value	OR ^b	95% CI ^c	Z-statistic	p-value	OR ^b	95% CI ^c	Z-statistic	p-value
INT group ^a	0.37	(0.12, 1.16)	−1.70	0.09	0.48	(0.14, 1.66)	−1.16	0.25	0.61	(0.31, 1.22)	−1.63	0.10

^aThe change over time in Suicidal Thinking (Items 5, 6 and 7) on the Concise Health Risk Tracking Scale-Self Report 7-Item (CHRT-SR₇) was compared between the two groups (Immediate Thrive Intervention, INT vs Waitlist Control, WLC) using a logistic regression model via a Generalized Estimating Equation analysis of repeated measures while adjusting for the baseline measure of suicidal thinking. The probabilities were modeled as agreement (presence) with suicidal thinking (yes/no)

^bEstimated Odds Ratio (OR) < 1 indicated lower predicted odds of suicidal ideation for INT vs WLC

^cOdds Ratio 95% Confidence Interval (CI) with corresponding Z-statistic and p-value

^dOverall difference in odds (baseline to week 8) between the INT AND WLC groups

16.5% achieved remission by week 8 (defined as PHQ-9 scores < 5.) Of those with moderate or greater symptom severity at baseline (PHQ-9 of ≥ 10) and follow-up data available (n = 51), 15.7% achieved remission by week 8. No participants that achieved remission at week 4 subsequently relapsed (PHQ-9 ≥ 10) at week 8. Only 22.8% reported experiencing suicidal ideation (PHQ-9 Item 9 scores of 1, 2 or 3, n = 79) at week 8 compared to the baseline proportion of 44.5%.

The mean number of lessons completed was 4.6 (± 5.7). A majority (69%) of INT group participants completed between 3 and 9 lessons (out of 30 total lessons). The cumulative number of lessons completed was significantly associated with decreased PHQ-9 [$F(1, 371.4) = 4.97, p = 0.026$] and GAD-7 [$F(1, 369.5) = 13.8, p < 0.001$] scores. Lesson completion did not

Table 3 Longitudinal outcomes of secondary clinical measures for intent-to-treat population

Secondary outcome measures	Baseline ^a		Week 8 ^b			Slope ^c		Effect ^d		Effect size ^e
	Mean	SD	LS mean	(SE)	95% CI	Mean	(SE)	F-statistic (df)	p-value	Cohen d
Depression symptom severity ^f										
WLC group (n = 230)	13.8	(5.5)	10.6	(0.29)	[10.0, 11.2]	− 3.0	(0.34)	F(1, 899.9) = 7.24	0.007	0.08
INT group (n = 218)	13.7	(5.3)	9.3	(0.39)	[8.56, 10.1]	− 4.3	(0.54)			
Anxiety symptom severity ^g										
WLC group (n = 230)	12.5	(5.0)	9.9	(0.27)	[9.37, 10.4]	− 2.6	(0.32)	F(1, 899.9) = 2.98	0.085	0.10
INT group (n = 218)	12.5	(4.8)	9.1	(0.36)	[8.42, 9.82]	− 3.3	(0.51)			
Work and social functioning ^h										
WLC group (n = 229)	22.4	(8.5)	19.5	(0.42)	[18.7, 20.4]	− 2.4	(0.49)	F(1, 895) = 0.48	0.491	0.06
INT group (n = 215)	21.8	(7.4)	19.1	(0.56)	[18.0, 20.2]	− 2.8	(0.78)			
Resilience ⁱ										
WLC group (n = 229)	20.9	(6.2)	22.1	(0.27)	[21.6, 22.7]	1.3	(0.32)	F(1, 895) = 0.44	0.510	0.13
INT group (n = 215)	20.9	(6.2)	21.8	(0.37)	[21.1, 22.6]	1.0	(0.52)			

WLC waitlist control group; INT immediate Thrive intervention group

^aWeek 0 (baseline) mean and standard deviation

^bWeek 8 least square (LS) mean and standard error (SE)

^cMean slope and standard error (SE) from baseline to week 8

^dp-value was associated with the test (F-statistic, Type III Tests of Fixed Effects) of the overall time period difference

^eCohen *d* between group effect size for unequal group sizes

^fPatient Health Questionnaire-9 (PHQ-9) score range = 0–27

^gGeneralized Anxiety Disorder Scale-7 (GAD-7) score range = 0–21

^hWork and Social Adjustment Scale (WSAS) score range = 0–40

ⁱConnor-Davidson Resilience Scale (CD-RISC-10) score range = 0–40

show statistically significant associations with measures of social adjustment [$F(1, 369.5) = 13.8, p = 0.948$] or resilience [$F(1, 355.7) = 3.44, p = 0.065$].

4 Discussion

The main objective of this study was to replicate and expand on our prior RCT which had shown that a fully automated iCBT program (Thrive) was effective in reducing depressive symptoms (primary outcome) and anxiety symptoms (secondary outcome), and improving social functioning and resilience (secondary outcomes) in a study sample of rural US adults, compared to a waitlist control group. In the present study, we used suicidal thinking as the primary outcome, retaining as a secondary objective a test of Thrive's impact on measures of depression, anxiety, work and social functioning, and resilience. Finally, like in the initial trial, we examined the association of program adherence with each outcome measure. As discussed below, our second trial partially replicated results from our initial trial.

First, the iCBT program did not significantly reduce suicidal thinking (not measured in our initial trial) compared to the WLC group. However, as in the first trial, it resulted in significant reductions of depressive symptoms. We are aware of only three published trials that used self-guided iCBT programs to reduce suicidal ideation which all reported significant intervention effects on suicidal thinking [35–37]. However, these studies are not directly comparable to our study because they specifically recruited adults with suicidal thoughts and used a program (“Living with Suicidal Thoughts”) that included additional (to CBT) components specifically designed to target suicidality (Dialectical Behavior Therapy, DBT). Hence, we cannot rule out that our negative findings are a function of sample composition (i.e., our sample did not include enough participants with suicidal thoughts at baseline, thus limiting our ability to detect an intervention effect). For example, a recent meta-analysis found that iCBT effects are stronger for patients with moderate or severe depression compared to less symptomatic patients [38]. Importantly, however, our replication finding of significant improvements in depression symptoms is heartening because depression is common in US

rural residents and yet they face substantial barriers to mental health care (e.g., dearth of providers, long distances to care providers, financial barriers) [13] that iCBT programs may help to address [17, 39].

We did not find statistically significant group differences in secondary outcomes of anxiety symptom severity, social functioning, or resilience, in contrast to our first trial where small to moderate between-group effect sizes favored the INT group. Of the iCBT trials that have examined anxiety, the results are also mixed with four studies showing no significant group differences [40–43] and three reporting small group differences [44–46]. Four trials assessing daily functioning/disability found either no significant group differences [44, 48] or a moderate effect size [46, 49]. We did not identify any studies examining iCBT impacts on resilience. As has been found in other studies [18, 22, 44], greater program adherence was associated with larger improvements in depression and anxiety symptoms and differences across published results in the secondary outcomes of interest in our trial may in part reflect differences in program adherence. Despite expert agreement that adherence is an important potential predictor of treatment outcome in digital interventions [18, 44], there is no agreed-upon measure or set of measures of program adherence in iCBT or other digital mental health interventions. To increase adherence, experts suggest that Design Thinking should be applied when developing future digital mental health interventions [49]. Design Thinking addresses existing barriers to user engagement, which is a primary path to program adherence and promises to overcome the “empathy gap” that may exist with digital mental health programs by focusing on the emotional and motivational nuances of users [49].

Our findings of an iCBT intervention’s favorable impact on reducing depression symptoms found here and in previous studies [21, 40–48], along with evidence of cost-effectiveness [39] should encourage policies that support dissemination of these intervention types for enhancing the work of mental health professionals. Rural mental health practitioners and other community leaders should be aware of these programs as complementary to traditional forms of care. Future work is needed on how best to integrate standard clinical care with iCBT intervention delivery, adherence, and progress towards improving mental wellbeing and quality of life. Emerging innovative technologies hold vast potential to provide platforms for integration of the spectrum of patient care. Future research should compare the degree to which clinicians actively monitor and engage patient outcomes with iCBT interventions and ultimate patient improvement.

4.1 Limitations

Several limitations should be considered when interpreting our findings. We decided to use the 3-item CHRT measure, which focuses specifically on suicidal ideation; as such, this reductive approach may exclude other complex risk factors for suicide. Moreover, we did not recruit specifically for individuals with suicidal thinking which may have obscured the potential clinical utility of the Thrive program for such individuals. Our 8-week attrition rates were disparate between study groups (nearly 62% among the INT group and 37% among the WLC group), which may have skewed our results. The study used self-assessments for each outcome measure, which may underestimate intervention effects compared to clinician-rated assessments [50]. Our adherence analyses were exploratory, as the study design did not systematically vary dosing of the lessons. Last, our findings should not be generalized to clinical populations; this was a pragmatic trial of adults who may or may not have received a mental health diagnosis.

4.2 Conclusions

In the context of US rural communities’ higher suicide rates and significant barriers to mental health care [8, 13], iCBT interventions offer a scalable strategy to deliver CBT skills for reducing depression, a risk factor of suicide ideation and behavior. Increasing evidence supports the effectiveness of iCBT interventions for reducing depression and anxiety [51]. Digital psychiatry interventions in general are showing promise [52]. We expect that with converging trends in technology and digital health science, we will be able to capitalize on innovative ways to address the existing mental healthcare access issues through digital mental health tools. Given the great tragedy of suicide in all communities, further study of the role iCBT programs for reducing depression, anxiety and other suicidal risk factors is clearly warranted.

Acknowledgements This study was funded by the Montana Department of Public Health & Human Services, House Bill 118 Suicide Prevention Initiative and the Montana Health Care Foundation. We thank Matt Kunz, Director of the Montana Chapter of the National Alliance for Mental Illness, for his leadership and support of the project.

Disclosure John Greist received royalty payments from Waypoint Health Innovations based on revenue from Thrive use until 2020. The terms of Dr. Greist's financial relationship with Waypoint Health Innovations have been reviewed by Montana State University, and his involvement with this research project has been approved in accordance with its conflict-of-interest policies.

Authors' contributions MS wrote the main manuscript; BM conducted study analyses and prepared tables and figures, and contributed to the writing of methods and results; JG contributed to the writing of the manuscript; RW contributed to the writing of the manuscript. All authors read and approved the final manuscript.

Data availability The data that support the findings of this study are available from the corresponding author upon request.

Declarations

Competing interests The authors declare no competing interests.

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