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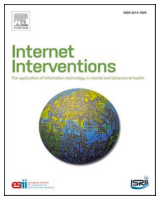

# Evaluation of additional resources used in therapist-assisted transdiagnostic internet-delivered cognitive behaviour therapy

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ABSTRACT

*Background:* In internet-delivered cognitive behavioural therapy (ICBT) programs, beyond standardized core ICBT lessons, brief additional resources are sometimes available to clients to address comorbid concerns or offer additional information/strategies. These resources remain understudied in terms of how they are selected and perceived by clients, as well as their relationship to satisfaction and outcomes.

*Methods:* Among clients ($N = 793$) enrolled in a 5-lesson transdiagnostic ICBT course, we examined client use and perceptions of 18 additional resources at 8 weeks in terms of whether clients found resources informative (yes/no) and or helpful (yes/no). Resources elaborated on cognitive strategies (managing beliefs, risk calculation) or on managing specific problems (agricultural stress, alcohol misuse, anger, assertiveness, chronic conditions, communication, grief, health anxiety, motivation, pain, panic, postpartum depression/anxiety, PTSD, sleep, workplace accomodations, worry). Clients also completed symptom measures and ICBT satisfaction questions at 8 weeks.

*Results:* Approximately 50 % ($n = 398$) of clients rated the resources and, on average, clients reported that 3.35 (SD = 3.34) resources were informative and 2.35 (SD = 2.52) resources were helpful as measured by direct questions developed for this study. Higher pre-treatment PTSD and GAD scores were related to a greater number of resources perceived as informative and or helpful. Rating more resources as informative and or helpful had a weak but positive association with ICBT satisfaction and depression, anxiety, PTSD and insomnia change scores. Limitations of the study include that 31 % ($n = 245$) did not respond to questions about use of resources and 18.9 % ($n = 150$) said they did not review resources.

*Conclusions:* There is considerable use of diverse additional resources in ICBT in routine care. Associations suggest that clients are using resources to personalize treatment to their needs and these resources are associated with treatment satisfaction and outcomes. The correlational associations between symptoms and perceived helpfulness of resources can help inform personalization algorithms to optimize ICBT delivery for clients. Further research on how to match clients with, encourage use of, and maximize benefits of resources would be beneficial.

## 1. Introduction

Internet-delivered cognitive behaviour therapy (ICBT) is an accessible, flexible, and effective form of mental health care that has grown in reputation over the last few decades (Andersson et al., 2019; Etzelmueller et al., 2020). In ICBT, clients have access to web-based lessons or modules that include psychoeducation and cognitive-behavioural skills (e.g., relaxation strategies, cognitive restructuring, graded exposure, and relapse prevention). ICBT has been found to be as effective as face-to-face therapy for a variety of mental health concerns (Hedman-Lagerlöf et al., 2023). Despite these promising findings, there is still room for improvement to prevent premature drop-out from ICBT (van Ballegooijen et al., 2014) and to improve client outcomes (Rozental et al., 2019).

Clients accessing ICBT often have comorbid mental health concerns, which highlights the need for transdiagnostic ICBT programs (Newby et al., 2016; Păsărelu et al., 2017). Transdiagnostic ICBT is often offered in a "one size fits all" standardized format, meaning that all clients

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receive the same treatment materials (Schaeuffele et al., 2021). In contrast, clients can be offered a tailored or personalized ICBT course based on their presenting concerns. In ICBT, "tailoring" often involves therapists selecting relevant modules for clients at the outset of ICBT, based on the client's individual needs and clinical presentation (e.g., Carlbring et al., 2011; Johansson et al., 2012). In one randomized controlled trial, participants with major depressive disorder and various comorbid symptoms were randomized to receive tailored ICBT, standardized ICBT, or an active control which included an online discussion group (Johansson et al., 2012). The tailored ICBT program had superior outcomes in terms of reduction in depressive symptoms and recovery rates among participants with more severe depressive symptoms and comorbidity. Other studies have also found that individually tailored ICBT is effective and that clients are satisfied with and perceive it as being credible for various presenting concerns such as symptoms of depression, posttraumatic stress disorder, social anxiety, worry, stress, insomnia, and panic (Andersson et al., 2021; Kraepelin et al., 2019; and Silfvernagel et al., 2018).

Although "tailored" and "personalized" ICBT are sometimes used interchangeably, a recent model of personalization by Cohen et al. (2021) highlights how personalization appears to be more involved and can offer more flexibility for both therapists and clients. Cohen et al.'s (2021) three dimensions of personalization (3DP) model outlines several ways that therapy can be personalized for clients based on: the timing of personalization decisions (e.g., before, during, or after treatment), the level of intervention (e.g., focused on treatment intensity, modality, or style of delivery), and the structure of the personalization model (e.g., basing personalization decisions on idiosyncratic differences versus statistical models). A notable limitation of the research is that most studies focus on personalization decisions prior to treatment (Nye et al., 2023), suggesting the need for more studies examining personalization decisions during treatment.

The results of a recent systematic review and meta-analysis of 17 studies suggest that personalized psychological interventions have an advantage over standardized treatments, particularly in the context of depression outcomes (Nye et al., 2023). While personalizing ICBT has the potential to improve client adherence and outcomes, we found sparse literature on the use of additional resources within ICBT programs.

That is, one way to personalize ICBT is to provide additional resources that clients can access at any point during ICBT. When accessing transdiagnostic ICBT, clients may have additional concerns that are not addressed directly in the core ICBT lessons (e.g., anger, problematic alcohol use, or sleep difficulties). Offering a menu of additional resources can be a flexible way for clients to access psychoeducation and strategies that are relevant to them, without needing to seek it from an external source or requiring all clients to complete strategies that may not apply to them. Personalization decisions about additional resources can be either client-driven (i.e., the client selects resources relevant to them) or therapist-driven (i.e., the therapist recommends resources based on information from the client during intake, from symptom questionnaires, or communication during ICBT). In both cases, the use of additional resources can be an example of personalization during treatment. Knowing how clients engage with additional resources (e.g., perceptions, preferences, usage) is valuable for further refinement of ICBT.

Recently, several studies were conducted to examine predictors of clients accessing specific additional resources, clients' perceptions of the resources, and the association between accessing certain resources and client outcomes at post-treatment. Each of these studies focused on a single resource including building motivation (Horse et al., 2023), managing insomnia symptoms (Peynenburg et al., 2022), and managing problematic alcohol use (Peynenburg et al., 2023), that were available to clients during an 8-week transdiagnostic ICBT course. Out of 763 clients, 15 % downloaded an additional resource focused on building motivation (Horse et al., 2023). Clients who reviewed the resource were older and had more education, as well as more severe depressive symptoms and less severe anxiety symptoms at pre-treatment, compared to non-reviewers. About two-thirds of clients reported making a positive change to their behaviour after reviewing the resource.

In the study examining a resource on managing insomnia symptoms (Peynenburg et al., 2022), 30.1 % of clients downloaded the resource and reviewers were older and had more severe insomnia symptoms at pre-treatment compared to non-reviewers. Finally, 10.8 % of clients downloaded the resource on managing problematic alcohol use (Peynenburg et al., 2023). Resource reviewers were older, more likely to be separated or divorced, consumed more drinks more week, had higher scores on a measure of alcohol use, and were more likely to exhibit hazardous drinking, compared to non-reviewers.

Clients provided positive feedback about each of the three additional resources, with 94 % (Horse et al., 2023), 92 % (Peynenburg et al., 2022), and 88.2 % (Peynenburg et al., 2023) of clients who reported using the respective resources indicating that the resource was worth their time. A shared finding across the three studies was that clients who downloaded each of the resources were more engaged with the ICBT course compared to non-reviewers (i.e., more likely to complete all core lessons and sent more messages to their therapists). However, accessing the resource was not associated with additional improvements in symptoms from pre-treatment to post-treatment (Horse et al., 2023; Peynenburg et al., 2022, 2023). These three studies offer helpful information about predictors of accessing specific additional resources and clients' experiences with each of the resources and suggest that a single additional resource is unlikely to significantly impact clients' outcomes at pre-treatment. To date, less is known about client use of a range of additional resources and how such use impacts engagement and treatment outcomes in ICBT. Understanding client use of additional resources has significant potential to inform ICBT programming – such as whether to include such additional resources, how many resources to include and whether to enhance such resources. This approach is aligned with the recommendations from a recent systematic review and component network meta-analysis using individual participant data for ICBT for depression (Furukawa et al., 2021). The authors concluded that identifying beneficial and potentially detrimental components of ICBT can lead to decisions about which content to include and exclude.

### 1.1. *The present study*

Within the present study, "personalization" refers to allowing patients the freedom to choose and utilize additional resources based on their own understanding of the problem and needs or as recommended by the therapist during ICBT based on continuous assessment of the patient's progress (see Cohen et al., 2021; Hornstein et al., 2023).

The present study expanded on the above research by examining clients' uptake of and experiences with a wide range of additional resources, rather than focusing on a single additional resource at a time. An additional objective was to examine whether use of the additional resources was associated with changes in symptoms from pre-treatment to post-treatment. In particular, we aimed to answer the following questions related to transdiagnostic ICBT: 1) what resources do clients most commonly access and report reviewing?; 2) what resources are most likely to be rated as informative and helpful?; 3) what is the relationship between review of resources and client engagement and satisfaction with ICBT?; 4) what are the clinical characteristics of clients who access a resource and rate it as informative and helpful?; and 5) how are clients' use and ratings of additional resources related to changes in symptoms from pre-treatment to post-treatment?

This study was largely exploratory in nature, so no specific hypotheses were made about which resources would be downloaded the most and rated as most informative and helpful. Based on limited previous studies, it was hypothesized that clients who downloaded more resources would be more engaged and satisfied with ICBT overall (Horse et al., 2023; Peynenburg et al., 2022, 2023). For resources focused on

specific diagnostic concerns (e.g., insomnia, PTSD, or panic disorder), it was hypothesized that clients who downloaded the resources would have higher pre-treatment scores on relevant pre-treatment symptoms compared to clients who did not access the resource. No further hypotheses were made due to limited research on predictors of accessing additional resources and the impact of additional resources on changes in symptoms.

## 2. Methods

### 2.1. Design and ethics

This was an observational study that was conducted as part of routine service delivery within the Online Therapy Unit (OTU). Funded by the government of Saskatchewan, the unit's primary focus is to offer therapist-assisted ICBT to residents of Saskatchewan. The research received approval from the University of Regina Research Ethics Board (file #2019–197). All clients provided informed consent.

### 2.2. Recruitment

Clients ($N = 793$) who enrolled in the Wellbeing Course between June 2022 and June 2023 were included in the current analyses. Prospective clients learned about the OTU through a variety of sources including: family physicians and other healthcare practitioners, community mental health clinics, online advertising, word of mouth, and media or email announcements.

### 2.3. Eligibility criteria

To be eligible for the program and the current analyses, clients had to meet the following criteria: (i) be at least 18 years of age, (ii) self-report symptoms of anxiety and/or depression, (iii) reside in the province of Saskatchewan for the 8-week treatment period, (iv) have regular Internet access, and (v) willingness to provide a medical contact (e.g., family physician) in the event of emergency. Clients were ineligible for the program and current analyses if they: (i) were at a high risk of suicide, (ii) had unmanaged psychosis or mania, (iii) had primary problems alcohol or drug use, or (iv) were hospitalized for their mental health in the previous year.

### 2.4. Intervention

All clients received the *Wellbeing Course* – a 5-lesson transdiagnostic ICBT course developed by the eCentreClinic at Macquarie University (Titov et al., 2015; see Guliani et al., 2022) and licensed by the Online Therapy Unit (see Appendix A). The lessons are presented in a slideshow format and each lesson includes case stories and downloadable do-it-yourself (DIY) homework exercises. The lessons focus on: (i) psychoeducation about the CBT model and symptom identification; (ii) thought monitoring and challenging; (iii) strategies for managing physiological arousal and pleasant activity scheduling; (iv) graded exposure; and (v) relapse prevention.

Throughout the Wellbeing Course, clients had access to 18 additional resources that clients could review at any time. Most of the resources ranged in length from 12 to 18 pages (1576–9318 words) and were provided in document form, including mostly text supported by some photos. The text was a combination of didactic information and case examples and stories. Each resource aimed to provide relevant therapeutic information and teach skills or tips for managing the symptoms or problems covered in the resource. The 5 course lessons were described as providing the core therapeutic information and the core psychological skills. However, clients were informed that the course included a broad range of additional resources, which were relevant and helpful for some clients. Clients were informed that the additional resources were optional and should only be used where the client thought they were relevant. However, therapists could also direct client's to the additional resources based on their communications with clients – e.g., if a client reported difficulties with sleep, the therapist might recommend they look at the sleep resource.

Additional resources included some resources developed at Macquarie University (i.e., PTSD, panic, anger, grief, worry, sleep, chronic conditions, pain, assertiveness, communication skills, beliefs, mental skills) and some additional resources developed based on client needs within the Online Therapy Unit (i.e., coping with low motivation, new motherhood, alcohol use, health anxiety, workplace accommodations, and mental health in agriculture). Two of the original resources (i.e., beliefs and mental skills) elaborated on cognitive skills presented in lesson 2.

### 2.5. Measures[2]

Clients completed an online screening questionnaire at pre-treatment, and a series of questionnaires about symptoms, use and evaluation of additional resources, and treatment satisfaction at post-treatment.

#### 2.5.1. Demographics

During the online screening, clients provided information about the following: age, gender, marital status, ethnocultural background, education, employment status, and the size of the community they reside in.

#### 2.5.2. Primary outcome measures

*2.5.2.1. Additional resource questions.* Participants answered two questions about their use of ARs: 1) Which (if any) additional resources have you found informative? and 2) Which (if any) additional resources have you found helpful for improving your wellbeing?

#### 2.5.3. Secondary outcome measures

*2.5.3.1. Generalized Anxiety Disorder 7-Item (GAD-7; Spitzer et al., 2006).* The GAD-7 is a 7-item self-report questionnaire that measures symptoms of generalized anxiety. Total scores range from 0 to 21, and a score of 10 or higher is used to identify clinically significant symptoms (Spitzer et al., 2006). Cronbach's alpha in the current analyses was 0.87–0.90.

*2.5.3.2. Insomnia Severity Index (ISI; Bastien et al., 2001).* The ISI is a 7-item self-report questionnaire that assesses symptoms of insomnia. Total scores range from 0 to 28, and a score of 10 or higher is found optimal for detecting clinical levels of insomnia (Morin et al., 2011). Cronbach's alpha in the current analyses was 0.89–91.

*2.5.3.3. Panic Disorder Severity Scale Self-Report (PDSS-SR; Shear et al., 2001).* The PDSS-R consists of 7 self-report items to assess for symptoms of panic disorder. Total scores range from 0 to 28 and a score $\geq 8$ has been used in previous ICBT trials to identify those who likely have panic disorder (Allen et al., 2016). Cronbach's alpha in the current analyses was 0.92–0.92.

[2] Clients completed additional measures (i.e., a homework reflection questionnaire (Hadjistavropoulos et al., 2020), the Things You Do questionnaire (Titov et al., 2022), the Adjustment Disorder New Module-8 (ADNM-8; Kazlauskas et al., 2018) the Alcohol Use Disorder Identification Test (AUDIT; Saunders et al., 1993), the Timeline Follow-Back (TLFB; Sobell and Sobell, 1992), the Drug Use Disorder Identification Test (DUDIT; Berman et al., 2002), the Life Events Checklist for DSM-5 (LEC-5; Weathers et al., 2013), the Suicide Behaviours Questionnaire-Revised (SBQ-R; Osman et al., 2001), and the Work and Social Adjustment Scale (WSAS; Mundt et al., 2002) as part of the Online Therapy Unit routine practice, which are not reported in this paper.

*2.5.3.4. Patient Health Questionnaire 9-Item (PHQ-9; Kroenke et al., 2001).* The PHQ-9 is a 9-item self-report questionnaire used to screen for depressive symptoms. Total scores range from 0 to 27, with higher scores indicating more severe depressive symptoms (Kroenke et al., 2001). A cut-off of 10 or more is often used to identify a possible diagnosis of major depressive disorder (Manea et al., 2012), although others have noted that a higher cut-off may be appropriate (Titov and Andersson, 2022). Cronbach's alpha in the current analyses was 0.85–0.89.

*2.5.3.5. Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5; Blevins et al., 2015).* The PCL-5 includes 20 self-report questions that correspond with the DSM-5 symptoms of PTSD. Scores range from 0 to 80 and a score of 31 to 33 or higher suggests likely difficulties with PTSD (Blevins et al., 2015). Cronbach's alpha in the current analyses was 0.94–0.96.

*2.5.3.6. Social Interaction Scale and Social Phobia Scale (SIAS-6/SPS-6; Peters et al., 2012).* The SIAS-6 and SPS-6 each consist of 6 self-report items that can be summed to create a total score to assess social anxiety (range: 0 to 48). An SIAS-6 score $\geq 7$ and SPS-6 score $\geq 2$ has been used to identify those who likely have social anxiety disorder (Peters et al., 2012). Cronbach's alpha in the current analyses was SIAS: 0.85–0.86; SPS: 0.92–0.93.

### 2.5.4. Treatment engagement

Treatment engagement was tracked through the ICBT platform and was defined as the number of lessons accessed, which could range from 1 to 5.

### 2.5.5. Treatment satisfaction

Clients were asked a series of treatment satisfaction questions at post-treatment including: rating their satisfaction with treatment overall and treatment materials (1 – "very dissatisfied" to 5 – "very satisfied"), and how much the course impacted their confidence to manage their symptoms and to seek treatment again in the future if needed (both rated from 1 – "greatly reduced" to 5 – "greatly increased"). Clients were also asked whether the treatment was worth their time and whether they would recommend it to a friend (both "Yes" or "No), but these questions were not included in the analyses.

## 2.6. Data analysis

Statistical analyses were conducted using IBM SPSS Statistics (Version 29.0) and Microsoft Excel software. Upon our review of the data, the following 3 client groups were identified: clients who reported reviewing at least one additional resource ($n$ = 398, 50.19 %; "reviewed"), clients who reported not reviewing any of the resources ($n$ = 150, 18.92 %; "did not review"), and clients who did not respond to the additional resource questions ($n$ = 245, 30.90 % "no response"). Descriptive statistics were used to describe pre-treatment demographic and clinical characteristics for these 3 groups. Additionally, analysis of variance (ANOVA) and chi-square tests were used to evaluate differences among the three groups across pre- and post-treatment outcome variables, as well as engagement and satisfaction variables. Correlations were calculated to assess the relationship between the frequency of downloading additional resources as tracked by the website ("downloaded"), whether resources were reported to be reviewed ("reviewed"; No = 0, did not review any of the 18 additional resources; Yes = 1, reviewed at least 1 of the additional resources available), and the ratings of resources as informative and/or helpful ("informative and/or helpful"), and the pre- and post-treatment outcome variables. Pearson correlation coefficients ($r$) were used for continuous variables, point biserial correlation coefficients ($r_{pb}$) were used when one variable was categorical, and phi correlations coefficients ($r_{\phi}$) were used when both variables were categorical. Multiple regression analyses were conducted to examine the effect of independent variables (i.e., downloaded, reviewed, informative and/or helpful) on pre-post change scores of each outcome variable (dependent variables). Demographic variables that were significantly different among groups (i.e., reviewed, did not review, and non-response) at pre- and post-treatment were incorporated in the final multiple regression models to account for their potential influence on pre-post change scores. All the independent variables were simultaneously included in the final regression models.

A multiple regression analysis was also conducted for each of the outcome variables (dependent variables; e.g., symptoms of generalized anxiety, depression, panic disorder, etc.) to examine the relationship between the additional resources downloaded (sum of the number of times each resource was downloaded), whether participants reporting reviewing at least one additional resource (No = 0 and Yes = 1), rated them as informative and/or helpful (sum of the number of resources rated as informative and/or helpful), and the pre-post change scores on each of the outcome variables.

Composite variables were created for both the downloaded and rated as informative and/or helpful variables to address potential multicollinearity issues arising from the high intercorrelations between predictors (see Correlation Table in Appendix B). This involved summing the individual accessed and individual informative and/or helpful variables. Furthermore, to streamline the analysis and avoid including predictors with low endorsement rates (i.e., $\leq$ 10 %), five additional resources—namely, alcohol misuse, agricultural stress, postpartum stress, understanding pain, and managing chronic conditions—that had the least number of downloads, reviews, and ratings as informative and helpful (see Table 3) were excluded from the composite variables. Consequently, only the composite variables were utilized as predictors in the multiple regression analyses.

## 3. Results

Pre-treatment client characteristics are described in Table 1. Most clients identified as women, being in a married or common-law relationship, White, living in a large city, educated beyond high school, and employed. There were notable differences on age and ethnicity among the groups of people who reviewed, did not review, and did not respond to the additional resource questions (no response group). Reviewers were older than both the "did not review" and "no response" groups, $F(2, 790) = 11.2$, $p < .001$. Additionally, reviewers were more likely to be White, $\chi^2(4) = 22.99$; $p < .001$. All three groups were comparable in other demographic characteristics (see Table 1). These groups were also comparable in terms of all the pre-treatment clinical characteristics except for SIAS-6/SPS-6 scores. In this case, a one-way ANOVA showed a statistically significant difference in SIAS-6/SPS-6 scores by groups ($F(2, 790) = 3.51$, $p = .048$) (see Table 2). However, a Bonferroni corrected post-hoc test did not reveal a significant pairwise difference between any of the groups ($p$ range: 0.10–1).

Table 3 presents the percentages for each of the additional resources downloaded, reviewed, and rated as informative and helpful. Out of the total clients ($N$ = 793), 81.1 % downloaded at least one additional resource, while 18.9 % did not download any additional resources. On average, patients downloaded 5.64 resources (SD = 5.46). The resources most frequently downloaded were managing worry (53.6 %), managing beliefs (45.8 %), and building motivation (42.4 %). Among clients who reported reviewing at least one additional resource ($n$ = 398; 50.2 %), on average, they indicated that 3.35 ($SD$ = 3.34) resources were informative, and 2.35 ($SD$ = 2.52) resources were helpful. The most frequently reviewed resources among those who reviewed resources included managing worry (64.1 %), managing beliefs (45.2 %), anger (34.4 %), and coping with health anxiety (34.4 %). Rates of perceived informativeness ranged from 87.5 % (workplace stress) to 100 % (agricultural stress) and rates of perceived helpfulness ranged from 38.1 % (managing chronic conditions) to 80.9 % (managing worry). Refer to Table 3 for additional details.

**Table 1**
Patient pre-treatment characteristics by additional resources reviewed, not reviewed, and non-response groups.

| Variable | All patients ($N = 793$) | Additional Resources Reviewed ($n = 398$) | Additional Resources Not Reviewed ($n = 150$) | Additional Resources No response ($n = 245$) | Statistical Significance $\chi^2$ or $F$-test |
|---|---|---|---|---|---|
| | *n* (%) | *n* (%) | *n* (%) | *n* (%) | |
| Participant Pre-Treatment Characteristics | | | | | |
| Age | | | | | |
| Mean (*SD*) | 39.2 (13.9) | 41.1 (14.2) | 34.9 (12.5) | 38.7 (13.7) | $F(2, 790) = 11.2$, $p \leq 0.001$ |
| Range | 18–83 | 18–83 | 18–79 | 18–76 | |
| Gender | | | | | |
| Men | 215 (27.1) | 102 (25.6) | 48 (32.0) | 65 (26.5) | |
| Women | 560 (70.6) | 288 (72.4) | 96 (64.0) | 176 (71.8) | $\chi^2$ (4) = 5.24; $p = .26$* |
| Other | 18 (2.3) | 8 (2.0) | 6 (4.0) | 4 (1.6) | |
| Marital status | | | | | |
| Single/never married | 224 (28.2) | 108 (27.1) | 52 (34.7) | 64 (26.1) | |
| Married/common law | 486 (61.3) | 255 (64.1) | 81 (54.0) | 150 (61.2) | $\chi^2$ (4) = 6.84; $p = .14$ |
| Separated/divorced/widowed | 83 (10.5) | 35 (8.8) | 17 (11.3) | 31 (12.7) | |
| Education | | | | | |
| High school diploma or less | 154 (19.4) | 81 (20.4) | 31 (20.7) | 42 (17.1) | |
| Some college/university education | 221 (27.9) | 108 (27.1) | 44 (29.3) | 69 (28.2) | $\chi^2$ (6) = 8.88; $p = .18$ |
| Post high school certificate/diploma/ | 137 (17.3) | 76 (19.1) | 29 (19.3) | 32 (13.1) | |
| University education | 281 (35.4) | 133 (33.4) | 46 (30.7) | 102 (41.6) | |
| Employment status | | | | | |
| Employed | 444 (56.0) | 217 (54.5) | 87 (58.0) | 140 (57.1) | |
| Unemployed | 44 (5.5) | 25 (6.3) | 7 (4.7) | 12 (4.9) | |
| Retired | 52 (6.6) | 33 (8.3) | 5 (3.3) | 14 (5.7) | $\chi^2$ (10) = 12.51; $p = .25$ |
| Student | 52 (6.6) | 19 (4.8) | 13 (8.7) | 20 (8.2) | |
| Homemaker | 115 (14.5) | 55 (13.8) | 26 (17.3) | 34 (13.9) | |
| Disability | 86 (10.8) | 49 (12.3) | 12 (8.0) | 25 (10.2) | |
| Ethnicity | | | | | |
| Caucasian | 657 (82.8) | 352 (88.4) | 116 (77.3) | 189 (77.1) | |
| Indigenous | 51 (6.4) | 18 (4.5) | 8 (5.3) | 25 (10.2) | $\chi^2$ (4) = 22.99; $p < .001$ |
| Other | 85 (10.7) | 28 (7.0) | 26 (7.3) | 31 (12.7) | |
| Location | | | | | |
| Small rural location (under 20,000) | 270 (34.0) | 140 (35.2) | 49 (32.7) | 81 (33.1) | |
| Small to medium city (20,000−100,000) | 64 (8.1) | 33 (8.3) | 11 (7.3) | 20 (8.2) | $\chi^2$ (4) = 0.71; $p = .95$ |
| Large city (over 100,000) | 459 (57.9) | 225 (56.5) | 90 (60.0) | 144 (58.8) | |

* Fisher-Freeman-Halton Exact Test.

### 3.1. Treatment satisfaction and engagement

Treatment satisfaction and engagement for each of the three groups are presented in Table 4. Overall, 81.7 % of the clients reported being satisfied with the treatment overall, while 90.2 % reported satisfaction with the treatment materials. Regarding engagement with the treatment, 65.3 % completed all five online lessons, with clients completing an average of 4.2 lessons ($SD = 1.2$). Significant differences were observed among the reviewed, not reviewed, and non-response groups in terms of overall satisfaction ($\chi^2$ (4) = 28.36; $p < .001$), satisfaction with treatment materials ($\chi^2$ (4) = 13.03; $p = .007$), the number of lessons completed ($\chi^2$ (2) = 199.37; $p < .001$), as well as in the mean number ($M = 4.2$, $SD = 1.2$) of lessons completed ($F$ (2, 790) = 183.07, $p < .001$). Clients who reviewed the resources were more likely than other groups to be satisfied with the treatment (i.e., 88.1 % vs. 65.3 % not reviewed, and 72.5 % non-response), with materials (i.e., 92.9 % vs. 81.6 % not reviewed, and 86.9 % non-response), and completing all the lessons (i.e., 85.4 % vs. 22.0 % not reviewed, and 59.2 % non-response) (see Table 4 for the details).

### 3.2. Correlation and multiple regression analysis

Correlation analyses were conducted between all 18 additional resources downloaded (e.g., worry, belief, panic), resources individually rated as informative and/or helpful, and the outcome variables at pre-treatment (see Correlation Table in Appendix B). The results revealed small but statistically significant and positive correlations between pre-treatment symptom scores and the related resources: higher pre-treatment ISI scores were associated with downloading (downloaded: No = 0 and Yes = 1) the sleep resource ($r_{pb} = 0.21$, $p < .001$) and rating it as informative and/or helpful ($r = 0.23$, $p < .001$). Similarly, higher pre-treatment PDSS scores were associated with downloading ($r_{pb} = 0.13$, $p < .001$) the panic resource and rating it as informative and/or helpful ($r = 0.20$, $p < .001$). Moreover, higher pre-treatment PCL-5 scores showed associations with downloading ($r_{pb} = 0.09$, $p = .03$) the PTSD resource and rating it as informative and/or helpful ($r = 0.17$, $p = .02$).

Furthermore, the downloaded, reviewed, and rated informative and/or helpful variables exhibited high intercorrelations (ranging from 0.63 to 0.66, $p < .001$) and positive correlations with treatment satisfaction (ranging from 0.15, $p = .003$ to 0.66, $p < .001$) as well as the number of lessons completed (ranging from 0.47 to 0.68, $p < .001$) (see Correlation Table in Appendix B).

As shown in Table 5, the downloaded and reviewed variables did not emerge as significant predictors of pre-post change scores on any of the outcome variables. However, a higher rating of additional resources as informative and/or helpful was a significant predictor of pre-post change scores for anxiety ($\beta = 0.20$, $SE = 0.06$, $p = .001$), depression ($\beta = 0.11$, $SE = 0.05$, $p = .03$), and PTSD ($\beta = 0.43$, $SE = 0.17$, $p = .01$). These results suggest that a higher overall rating of additional resources as informative and/or helpful was significantly associated with a higher degree of change in anxiety, depression, and PTSD scores at post-treatment.

## 4. Discussion

The present study investigated clients' experiences with a variety of additional resources in ICBT, including their uptake, perceptions of helpfulness and informativeness, and how usage and ratings of the resources were associated with treatment engagement, treatment

**Table 2**
Descriptive statistics for outcome variables by additional resources reviewed, not reviewed, and no response groups.

| | Pre-treatment | | | | Post-treatment (8 weeks) | | | |
|---|---|---|---|---|---|---|---|---|
| Variables | n | Mean | SD | Statistical Significance | n | Mean | SD | Statistical Significance |
| GAD-7 | | | | $F$ (2, 790) = 0.60, $p$ = .550 | | | | $F$ (2, 577) = 0.27, $p$ = .77 |
| No response | 245 | 12.20 | 5.32 | | 169 | 6.36 | 4.78 | |
| Not reviewed | 150 | 12.31 | 5.39 | | 51 | 6.24 | 5.29 | |
| Reviewed | 398 | 12.65 | 5.21 | | 360 | 6.04 | 4.82 | |
| Total | 793 | 12.45 | 5.27 | | 580 | 6.15 | 4.85 | |
| ISI | | | | $F$ (2, 790) = 0.81, $p$ = .444 | | | | $F$ (2, 567) = 0.71, $p$ = .49 |
| No response | 245 | 12.68 | 6.10 | | 163 | 9.98 | 5.99 | |
| Not reviewed | 150 | 13.37 | 6.74 | | 50 | 10.82 | 7.00 | |
| Reviewed | 398 | 13.29 | 6.56 | | 357 | 9.73 | 6.10 | |
| Total | 793 | 13.12 | 6.46 | | 570 | 9.90 | 6.15 | |
| PDSS | | | | $F$ (2, 790) = 0.45, $p$ = .640 | | | | $F$ (2, 563) = 1.56, $p$ = .21 |
| No response | 245 | 7.51 | 5.93 | | 161 | 4.33 | 4.71 | |
| Not reviewed | 150 | 8.08 | 6.26 | | 49 | 5.78 | 5.84 | |
| Reviewed | 398 | 7.89 | 6.41 | | 356 | 4.81 | 5.18 | |
| Total | 793 | 7.81 | 6.23 | | 566 | 4.76 | 5.12 | |
| PHQ-9 | | | | $F$ (2, 790) = 2.17, $p$ = .114 | | | | $F$ (2, 579) = 0.40, $p$ = .67 |
| No response | 245 | 13.04 | 5.88 | | 170 | 6.63 | 4.99 | |
| Not reviewed | 150 | 13.96 | 6.15 | | 51 | 6.92 | 6.24 | |
| Reviewed | 398 | 12.78 | 5.89 | | 361 | 6.32 | 5.33 | |
| Total | 793 | 13.08 | 5.95 | | 582 | 6.46 | 5.32 | |
| PCL-5 | | | | $F$ (2, 585) = 0.13, $p$ = .879 | | | | $F$ (2, 561) = 0.26, $p$ = .77 |
| No response | 184 | 35.82 | 17.86 | | 162 | 22.28 | 16.59 | |
| Not reviewed | 112 | 35.01 | 19.76 | | 49 | 21.41 | 17.42 | |
| Reviewed | 292 | 34.98 | 18.03 | | 353 | 21.16 | 16.15 | |
| Total | 588 | 35.25 | 18.29 | | 564 | 21.51 | 16.37 | |
| SIAS-6/ SPS-6 | | | | $F$ (2, 790) = 3.04, $p$ = .048 | | | | $F$ (2, 562) = 1.74, $p$ = .18 |
| No response | 245 | 15.13 | 11.46 | | 161 | 13.15 | 10.21 | |
| Not reviewed | 150 | 15.75 | 12.23 | | 49 | 11.61 | 11.01 | |
| Reviewed | 398 | 13.39 | 11.26 | | 355 | 11.36 | 10.09 | |
| Total | 793 | 14.37 | 11.54 | | 565 | 11.89 | 10.22 | |

*Notes*. N = 793; GAD-7 = Generalized Anxiety Disorder 7-Item, ISI = Insomnia Severity Index, PDSS-SR = Panic Disorder Severity Scale Self-Report, PHQ-9 = Patient Health Questionnaire 9-Item, PCL-5 = Posttraumatic Stress Disorder Checklist for DSM-5, SIAS-6 = Social Interaction and Anxiety Scale, and SPS-6 = Social Phobia Scale.

satisfaction, and changes in symptoms from pre-treatment to post-treatment. Prior to this study, it was known that additional resources could be beneficial to clients, but we did not know the extent of their use, which resources are most valued, and clients' perceptions of them. Over 50 % of clients in the present study reported reviewing the additional resources, and of those clients, they reported reviewing an average of 5 additional resources. Thus, additional resource use is substantial among a meaningful proportion of clients in structured ICBT, and these clients are potentially using additional resources (where provided) to personalize their ICBT. Indeed, examining correlations suggests that clients are selecting resources consistent with their symptom profile. For example, higher pre-treatment ISI scores were associated with downloading and rating the sleep resource as informative and/or helpful, while similar patterns were observed for PDSS and panic resources, and PCL-5 and PTSD resources. Regression analysis further showed that higher ratings of additional resources as informative and/or helpful were significant predictors of positive pre-post change scores for anxiety, depression, and PTSD. These insights have significant potential for developing personalization algorithms and rules (Furukawa et al., 2021), which could inform the creation of automated personalized recommendations for patients. This finding suggests that further research exploring additional resource use in ICBT, and how to optimize the personalization of additional resources in ICBT, is warranted.

The most downloaded additional resources were focused on managing beliefs, building motivation, and managing worry. Resources focused on managing worry, beliefs, and panic were rated as particularly informative and/or helpful. It is likely that these resources appealed to clients given the nature of concerns endorsed by clients who sought this treatment which was advertised as addressing a range of anxiety or mood disorders. While these represented the resources most often rated as informative and helpful, it is notable that every resource had some clients who accessed them, reported reviewing them and rated them as helpful and/or informative. These findings suggest that offering a menu of supplementary resources does appear to be beneficial in terms of allowing clients to personalize their ICBT experience during treatment. However, it is also possible that offering too many additional resources can be overwhelming to clients given that 18.9 % said they did not review resources and 30.9 % did not respond to questions about resources at all. In the future, it might be helpful to examine benefits/costs of reducing the list of options to the most downloaded resources. The current study helps to fill a gap in the research on treatment personalization, as most studies examine personalization decisions before rather than during treatment (Nye et al., 2023).

It was promising to find that client's clinical concerns (e.g., symptoms of insomnia, panic, or posttraumatic stress disorder) were associated with accessing the corresponding resource, as this suggests that the resources are being accessed by the intended audience. Our study also revealed significant associations between resource access treatment satisfaction, and completion rates. Consistent with previous research (e.g., Horse et al., 2023; Peynenburg et al., 2022, 2023), clients who accessed and reviewed additional resources reported higher levels of satisfaction with the treatment overall, as well as greater satisfaction with treatment materials. Moreover, they were more likely to complete all the online lessons compared to those who did not engage with additional resources. As the findings are correlational in nature it is not possible to know if satisfaction with treatment resulted in a greater number of resources being reviewed or alternatively if reviewing the additional resources enhanced engagement and satisfaction. Alternatively, it is possible that some third variable contributes to engagement, satisfaction, and resource review (e.g., motivation, fewer competing demands on time).

**Table 3**
Additional resources downloaded, reviewed, and indicated as informative or helpful.

| Additional resources | Downloaded | Reviewed [a] | Indicated as informative | Indicated as helpful |
|---|---|---|---|---|
| | n/793 (%) | n/398 (%) | n (%) | n (%) |
| Managing beliefs | 363 (45.8) | 180 (45.2) | 170 (94.4) | 135 (79.4) |
| Managing worry | 425 (53.6) | 255 (64.1) | 241 (94.5) | 195 (80.9) |
| Managing panic | 225 (28.4) | 158 (39.7) | 146 (92.4) | 101 (69.2) |
| Managing sleep | 332 (41.9) | 149 (37.4) | 141 (94.6) | 90 (63.8) |
| Understanding PTSD | 239 (30.1) | 90 (22.6) | 88 (97.8) | 55 (62.5) |
| Addressing anger | 331 (41.7) | 137 (34.4) | 132 (96.4) | 96 (72.7) |
| Communication | 269 (33.9) | 121 (30.4) | 109 (90.1) | 65 (59.6) |
| Building motivation | 336 (42.4) | 133 (33.4) | 126 (94.7) | 82 (65.1) |
| Coping with grief | 214 (27.0) | 79 (19.8) | 71 (89.9) | 53 (74.7) |
| Coping with health anxiety | 251 (31.7) | 137 (34.4) | 125 (91.2) | 78 (62.4) |
| Developing cognitive coping | 302 (38.1) | 106 (26.6) | 100 (94.3) | 58 (58.0) |
| Improving assertiveness | 275 (34.7) | 99 (24.9) | 94 (94.9) | 60 (63.8) |
| Managing workplace stress | 216 (27.2) | 56 (14.1) | 49 (87.5) | 30 (61.2) |
| Managing agricultural stress | 99 (12.5) | 10 (2.5) | 10 (100) | 4 (40.0) |
| Managing chronic condition | 166 (20.9) | 23 (5.8) | 21 (91.3) | 8 (38.1) |
| Understanding pain | 166 (20.9) | 40 (10.1) | 33 (82.5) | 25 (75.8) |
| Balancing new motherhood | 134 (16.9) | 16 (4.0) | 15 (93.8) | 12 (80.0) |
| Managing alcohol misuse | 129 (16.3) | 22 (5.5) | 20 (90.9) | 13 (65.0) |

Notes. $N = 793$.
ICBT ($n = 398$).
[a] Total number of clients identified as reporting they reviewed at least one additional resource during.

**Table 4**
Treatment engagement and satisfaction by additional resources reviewed, not reviewed, and non-response groups.

| Variable | All patients ($N = 793$) | Reviewed ($n = 398$) | Not reviewed ($n = 150$) | No response ($n = 245$) | Statistical Significance $\chi^2$ or $F$-test |
|---|---|---|---|---|---|
| | $n$ (%) | $n$ (%) | $n$ (%) | $n$ (%) | |
| Satisfaction | | | | | |
| Satisfied overall | 459 (81.7) | 311 (88.1) | 32 (65.3) | 116 (72.5) | $\chi^2$ (4) = 28.36; $p$ < .001* |
| Neutral | 91 (16.2) | 37 (10.5) | 14 (28.6) | 40 (25.0) | |
| Dissatisfied | 12 (2.1) | 5 (1.4) | 3 (6.1) | 4 (2.5) | |
| Satisfied with materials | 507 (90.2) | 328 (92.9) | 40 (81.6) | 139 (86.9) | $\chi^2$ (4) = 13.03; $p$ = .007* |
| Neutral | 48 (8.5) | 24 (6.8) | 7 (14.3) | 17 (10.6) | |
| Dissatisfied | 7(1.2) | 1(0.3) | 2 (4.1) | 4 (2.5) | |
| Engagement | | | | | |
| Completed all lessons (1–5) | | | | | $\chi^2$ (2) = 199.37; $p$ < .001 |
| Yes | 518 (65.3) | 340 (85.4) | 33 (22.0) | 145 (59.2) | |
| No | 275 (34.7) | 58 (14.6) | 117 (78.0) | 100 (40.8) | |
| Lessons completed M (SD) | 4.2 (1.2) | 4.8 (0.6) | 2.9 (1.5) | 4.1 (1.3) | $F$ (2, 790) = 183.07, $p$ < .001 |

* Fisher-Freeman-Halton Exact Test.

Despite the positive association with lesson completion and satisfaction, our results did not indicate a significant association between accessing additional resources and improvements in symptomatology. Rather it appears that clients' ratings of resource helpfulness and/or informativeness are a significant predictor of improvements in anxiety, depression, and PTSD symptoms post-treatment. When examining engagement with mental health interventions, it is recommended that behavioural, cognitive, and affective dimensions of engagement are measured (Bijkerk et al., 2023). In the context of the current study, lesson completion and resource review can be indicators of behavioural engagement. Perceptions about whether a resource is helpful and informative may be an indicator of cognitive and affective engagement. Therefore, it is unsurprising that resource access alone is not a good predictor of symptom changes, as it only measures one aspect of engagement. Clients might access an additional resource without fully reviewing it (limited behavioural engagement), review a resource without perceiving it to be suitable for their goals (limited cognitive engagement), or review a resource without experiencing much interest in the content (limited affective engagement).

### 4.1. Limitations and future directions

Several limitations should be considered when interpreting the findings from this study. The study's limitations stem from its observational nature, which precludes making causal inferences regarding the relationship between additional resource utilization and treatment outcomes. The predominantly female and urban sample restricts the generalizability of findings to other populations. Additionally, the calculation of resources accessed was based on whether clients opened them on the online platform. However, since there were no specific questions asking whether each resource was reviewed or not, additional resource use data were derived considering: 1) online records of opening at least one additional resource, 2) responses indicating that at least one resource was informative or helpful assessed at week 4 or 8, and 3) negations to "I have not reviewed resources yet." While marking at least one additional resource as informative and or helpful suggests review, it does not definitively confirm it, nor does it indicate the extent of engagement. Therefore, future studies would benefit from asking "Did you review the resource?" for each additional resource (behavioural engagement), as well as incorporating detailed evaluations of cognitive and affective engagement with additional resources (e.g., see Sapkota et al., 2023 for a more comprehensive understanding). Furthermore, it would be important to include an option for clients to indicate if additional resources were neither informative nor helpful.

In future studies, researchers could consider including resources that had high review rates, and were rated as both informative and helpful, as part of the core material to ensure all clients benefit from it. Additionally, resources with low review rates and that were not perceived as informative or helpful could be removed to prevent clients from feeling overwhelmed by the range of resources. One compelling idea for future research is the use of automation for recommending resources. Specifically, AI-driven recommendations can streamline resource selection and enhance the user experience, by reducing the likelihood that clients will be overwhelmed by too many choices. Automated resource recommendations can facilitate personalized applications of ICBT that maximize therapeutic effects, reduce potential dropouts, and match treatments to individual patients' characteristics, needs, and preferences (Furukawa et al., 2021).

Alternatively, clients could be randomized to an ICBT course with or without additional resources to better understand the extent to which use of additional resources impacts outcomes. Another avenue of research could explore how therapists can best support clients in

**Table 5**
Multiple linear regression analysis showing significant predictors of pre-post change in outcome variables with predictor variables additional resources downloaded, reviewed, and perceived informative and helpfulness.

| Variables | Estimate (B) | SE | 95 % CI | | p |
|---|---|---|---|---|---|
| | | | LL | UL | |
| GAD-7 | | | | | |
| Intercept | 7.23 | 0.83 | 5.61 | 8.85 | <0.001 |
| Age# | −0.06 | 0.02 | −0.09 | −0.02 | 0.003 |
| Total number of additional resources rated informative and/or helpful | 0.23 | 0.07 | 0.10 | 0.36 | 0.001 |
| PHQ-9 | | | | | |
| Intercept | 5.617 | 0.417 | 4.80 | 6.44 | <0.001 |
| Total number of additional resources rated informative and/or helpful | 0.13 | 0.07 | 0.00 | 0.26 | 0.050 |
| PCL-5 | | | | | |
| Intercept | 8.38 | 1.36 | 5.70 | 11.05 | <0.001 |
| Total number of additional resources rated informative and/or helpful | 0.43 | 0.17 | 0.09 | 0.77 | 0.012 |

*Notes*. $N = 793$; CI = confidence interval; *LL* = lower limit; *UL* = upper limit; Generalized Anxiety Disorder 7-Item, PHQ-9 = Patient Health Questionnaire 9-Item; PCL-5 = Posttraumatic Stress Disorder Checklist for DSM-5. Only those predictors that were associated with outcome variables with $p$ values $< .2$ in bivariate comparisons were included in the final models. Results for three outcome variables are shown because for other outcome variables there were no associations with any of the predictor variables. Results of final models are presented.
#Age and ethnicity dichotomized (0 = white, 1 = Others) were significantly different by additional resources downloaded, reviewed, and rated as informative and/or helpful. These variables were included in the final regression models if they were also significantly associated with pre-post change in outcome variables in bivariate comparisons.

selecting or accessing additional resources. For example, therapists could ask clients at the beginning and midpoint of treatment about what they need as resources and then provide it to them. Cohen's 3DP model of personalization (Cohen et al., 2021) offers additional avenues for future research. Both the timing (e.g., at the beginning, throughout, or end of treatment) and delivery (e.g., slideshow format with homework) of the additional resources could be manipulated as well. Future studies could compare personalization decisions based on idiosyncratic differences versus computer-based models. It may also be worthwhile to include measures of transdiagnostic markers such as motivation, therapy expectations, rumination, or emotion regulation to investigate how use of the additional resources is both influenced by and influences these markers.

Considering suggestions from previous studies (e.g., Horse et al., 2023; Peynenburg et al., 2023), to reduce non-response, additional resource evaluation was administered at week 4 (midtreatment) and week 8 (post-treatment). However, responses were still missing from approximately one-third of clients. It is possible that some of the clients who did not respond to the questions actually reviewed the resource, as the web record shows that 81.1 % ($n = 643$) of clients accessed at least one resource during the treatment. However, due to their missing self-reports, we do not have information about their perceptions of the resource and whether the resource was helpful in reducing their symptoms.

## 5. Conclusion

This study underscores the value of offering additional resources as a means of personalizing and enhancing the engagement and effectiveness of transdiagnostic ICBT programs. While additional resources may not independently drive symptom improvement, they play a crucial role in fostering treatment engagement and satisfaction. Future research should continue to explore innovative approaches to resource selection and delivery, with a focus on optimizing treatment outcomes and addressing the diverse needs of clients accessing ICBT. In this way, ICBT programs can continue to evolve as a flexible and accessible form of mental health care.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A. Supplementary data

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