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RESEARCH REPORT

Electronic Interventions for Substance Use Disorders Among Offender Populations: A Systematic Review

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Electronic Interventions for Substance Use Disorders Among Offender Populations: A Systematic Review

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Correctional Service of Canada

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Executive Summary

Key words: *offenders, substance use disorders, addiction, intervention, treatment, electronic treatment, digital health*

Substance use disorders (SUDs) occur at a high prevalence of up to 75-86% among incarcerated individuals. Untreated SUDs confer risk for drug poisoning during incarceration and increased risk of recidivism following release. As a result, the availability of treatment to SUDs among incarcerated individuals is essential. Limitations to implementing evidence-based interventions in prison settings include a lack of knowledge of the favourable impacts of treatment on outcomes, stigma/limited SUD training and knowledge in correctional staff, and the availability of approaches that are not based in evidence. Therefore, it is important to identify effective, feasible, and accessible treatment modalities to address SUDs in incarcerated individuals.

Electronic interventions have clear potential in these settings due to advances in technology and greater feasibility than in-person treatment. This systematic review sought to synthesize research on electronic interventions for SUDs in correctional settings and identify the clinical and policy relevance for Correctional Service of Canada. First, a literature search was conducted across multiple databases with key terms associated with SUDs, electronic interventions, and correctional settings. Due to limited findings from this search and awareness of two electronic interventions for SUDs (Breaking Free Online [BFO] and CBT4CBT), a second literature search was conducted with the SUD search terms and BFO and CBT4CBT. A total of 11 studies were included in the review. Six were from the primary search. The second search yielded 3 studies examining the efficacy of BFO in correctional settings or justice-involved individuals. An additional two articles investigating BFO were identified from other sources. The studies were predominantly conducted in the United Kingdom or United States; none were conducted in Canada.

The studies were heterogenous and preliminary in nature, but with promising outcomes. There were early-stage ‘open-label’ (uncontrolled) intervention trials showing positive short-term

benefits of decreased substance use, increased self-efficacy, increased quality of life, and decreases in depressive/anxiety symptoms. The most common intervention was BFO, showing favourable outcomes and perspectives of the intervention. There were no CBT4CBT studies in correctional settings exclusively, but favourable results in other settings. Although all were from generally comparable countries, the direct applicability to the Canadian correctional system was not clear.

The existing literature reveals early-stage feasibility and proof-of-principle evidence that electronic SUD interventions may be implemented beneficially in correctional settings. Given the absence of Canadian studies, exploring the use of electronic interventions in Canadian correctional settings is a critical next step. Given the small amount of literature, feasibility and/or pilot trials would lay the foundation for more definitive randomized controlled trials in Canadian settings. Novel interventions will require consideration of existing programs and consultation with stakeholders, including offenders. Nonetheless, this review suggests substantial promise for electronic SUD interventions in correctional settings.

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Introduction

Substance use disorders (SUDs) disproportionately affect individuals involved in the criminal justice system. Indeed, in Canada, it is estimated that 75-86% of incarcerated individuals in federal prisons have a history of an SUD (Butler et al., 2022; Cram & Farrell MacDonald, 2022, 2024; Weekes et al., 2004). Additionally, despite substances being prohibited in prisons, substance use prevalence is higher in prison settings than in the general community, with a Quebec study showing 44% of individuals reporting using substances in the past 3 months while incarcerated (Chaisson & Farrell MacDonald, 2024; Plourde et al., 2012). The reasons for high rates are multifarious, including both obvious and more subtle factors. Obvious examples include that, as several psychoactive drugs are illegal, procurement, possession, or distribution are all illegal acts and drug intoxication is associated with a variety of crimes, from impaired driving to assault and homicide. More subtle factors include environmental exposures, such as dangerous neighborhoods, that are associated with both criminal behaviour and substance use (e.g., Cambron et al., 2020), and elevations in psychological mechanisms traits, such as impulsivity, that are associated with both criminal behaviour and substance use (e.g., Mathias et al., 2008), albeit with variability by type of impulsivity (Wendel et al., 2022).

In correctional settings, untreated SUDs confer increased risk for negative health outcomes such as HIV (van der Meulen, 2017), and have been linked to a higher risk of recidivism (Zgoba et al., 2020). A growing body of evidence suggests that treatment in prison settings is effective for decreasing recidivism, even if treatment is of relatively short duration (Clark, 2024). Aftercare services in addition to treatment prior to release may result in greater reductions in recidivism (Olson & Lurigio, 2014) .

Unfortunately, despite the high prevalence of active and historical SUD in incarcerated

individuals, research in other jurisdictions have found that a substantial proportion of individuals do not receive treatment (Kurdyak et al., 2022). Additionally, common treatments that are implemented in prison settings include drug education or low intensity counselling, which are often not evidence based (Belenko et al., 2013). Implementation of SUD treatment may be difficult in prison settings due to the stigma of addiction, limited SUD training in correctional staff (e.g., understanding the biology of addiction and as a psychiatric disorder), and lack of knowledge of the favourable impacts of treatment on outcomes for incarcerated individuals (i.e., decreased drug use and risk of recidivism). Issues with funding and availability of trained clinical staff are also potential barriers to SUD treatment (Belenko et al., 2013). To address these issues, Correctional Service of Canada has implemented programs to assist individuals with SUDs in their recovery including Self-Management and Recovery Program and the Prison Needle Exchange Program to help reduce the sharing of needles and opioid agonist treatment (OAT) for incarcerated individuals with opioid use disorder. In addition, indigenous and non-indigenous peer support programs are available (Correctional Service of Canada, 2024).

Given these considerations, it is important to identify alternative treatment modalities that are effective, feasible, and accessible to individuals in these settings to help individuals engage in treatment. One such approach is electronic interventions that may be implemented in prison settings or post-incarceration. Electronic interventions for SUDs (e.g., Carroll et al., 2008; Elison-Davies et al., 2018) are relatively well established, evidence-based, and have advantages such as being self-paced and easy to implement in a wide range of settings. Identifying studies implementing electronic interventions in prison settings or in the criminal justice system more broadly has clear potential to identify programming that may be of benefit in the Canadian criminal justice system and Correctional Service of Canada in particular. Accordingly, the 3

main objectives of this systematic review were to: 1) summarize and integrate empirical studies on electronic interventions for SUDs in correctional settings; 2) critically review and synthesize concordant and discordant findings; and 3) evaluate clinical and policy relevance for Correctional Service of Canada.

Method

Systematic Review Search Strategy and Study Selection

The primary literature search was conducted across four databases: AMED (Allied and Complementary Medicine; 1985 to October 2023), Embase (1996 to 2023 December 21), Ovid MEDLINE (1996 to December 21, 2023), PsycInfo (1987 to December Week 2 2023) for published, peer-reviewed papers in English. The main search concepts included substance use disorders, electronic interventions, and correctional settings. The search was limited to relatively recent articles (earliest possible = 1987) to focus on contemporary technology. Inclusion criteria comprised that studies were a) are peer-reviewed, and (b) written in English and (c) include an evaluation of an electronic intervention for SUDs in a criminal justice setting. Deduplication was executed following the initial search. Procedurally, Research Assistants at the Peter Boris Centre for Addictions Research (PBCAR) completed title and abstract screening for the initial search.

Due to the limited findings from the primary search and knowledge of two existing electronic interventions for SUDs (Breaking Free Online and CBT4CBT), a second literature search was conducted with the SUD search terms alongside “CBT4CBT” and “Breaking Free Online” across the same databases with the same inclusion criteria. For the second search, two research assistants (RAs) completed the title and abstract screening and full-text extraction, with discrepancies resolved by Dr. MacKillop.

Concept mapping and search terms are on the following page. The selection procedure is depicted in Figure 1 and followed Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA; Page et al., 2021).

CONCEPT MAPPING

1. SUBSTANCE USE DISORDERS
2. ELECTRONIC INTERVENTIONS
3. CORRECTIONAL SETTINGS

SUBSTANCE USE DISORDERS	ELECTRONIC INTERVENTIONS	CORRECTIONAL SETTINGS
KEY WORDS	KEY WORDS	KEY WORDS
ALCOHOL OR CANNABIS OR MARIJUANA OR COCAINE OR METHAMPHETAMINE OR STIMULANT OR OPIOID OR OPIATE OR HEROIN OR MORPHINE) AND ("USE DISORDER" OR ABUSE OR DEPENDENCE OR MISUSE OR ADDICTION)	**(COMPUTERIZED OR ELECTRONIC OR DIGITAL OR VIRTUAL OR SMARTPHONE) AND (TREATMENT OR INTERVENTION OR PROGRAM)** **2ND SEARCH ONLY: "BREAKING FREE ONLINE" OR "CBT4CBT"**	**(CRIM* OR FORENSIC OR OFENDER OR PRISON* OR INCARCERAT* OR PAROLE* OR RECIDIVISM OR JAIL OR COURT*)**
1	**2**	**3**

Note. For the second search, key words from the first concept, and a portion of the second concept (breaking Free Online and CBT4CBT were combined).

FINAL BOOLEAN SEARCH STRATEGY: 1 AND 2 AND 3

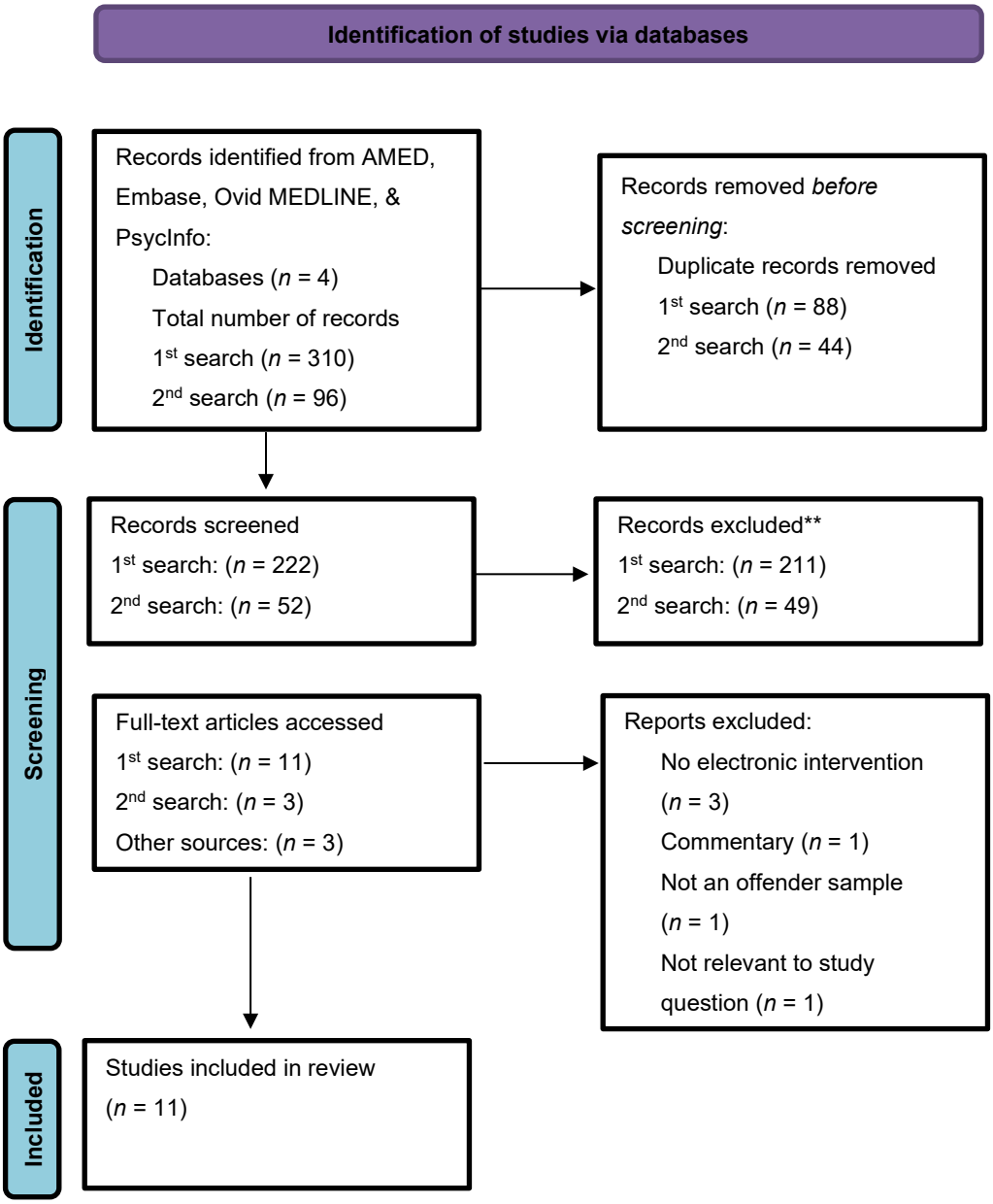
SPECIFIC SEARCH STRATEGY: SEARCH 1

((ALCOHOL or CANNABIS or MARIJUANA or COCAINE or METHAMPHETAMINE or STIMULANT or OPIOID or OPIATE or HEROIN or MORPHINE) and ("USE DISORDER" or ABUSE or DEPENDENCE or MISUSE or ADDICTION) and ((COMPUTERIZED or ELECTRONIC or DIGITAL or VIRTUAL or SMARTPHONE) and (TREATMENT or INTERVENTION or PROGRAM)) and (CRIM* or FORENSIC or OFENDER or PRISON* or INCARCERAT* or PAROLE* or RECIDIVISM or JAIL or COURT*)).mp. [mp=ab, hw, ti, tn, ot, dm, mf, dv, kf, fx, dq, bt, nm, ox, px, rx, ui, sy, ux, mx, tc, id, tm]

SPECIFIC SEARCH STRATEGY: SEARCH 2

((ALCOHOL or CANNABIS or MARIJUANA or COCAINE or METHAMPHETAMINE or STIMULANT or OPIOID or OPIATE or HEROIN or MORPHINE or SUBSTANCE) and ("USE DISORDER" or ABUSE or DEPENDENCE or MISUSE or ADDICTION or "SUBSTANCE USE DISORDER") and (" BREAKING FREE ONLINE" or "CBT4CBT)).mp. [mp=ab, hw, ti, tn, ot, dm, mf, dv, kf, fx, dq, bt, nm, ox, px, rx, ui, sy, ux, mx, tc, id, tm]

Figure 1. Flow chart depicting study selection process following PRISMA standards for the primary search.



Results

Overview

The initial literature search conducted on December 21st, 2023, yielded 222 unique records after removal of duplicates, of which 211 were deemed irrelevant based on title and abstract review. The remaining 11 articles were subjected to a full-text review, and 5 were excluded (see reasons for exclusion in Figure 1). A total of 6 studies were included from this search. The second search was conducted on February 9th, 2024, yielding 52 unique records after removing duplicates, of which 3 were subjected to a full-text review and included. Additionally, 3 relevant articles were uncovered outside of the search. Together, the review included a total of $k = 12$ relevant studies. Study characteristics, locations, and principal findings are in Table 1.

Results from the first search revealed $k = 6$ relevant articles, with only one study economically evaluating CBT4CBT in a sample containing criminal justice involved individuals. None of the other studies included Breaking Free Online (BFO), CBT4CBT, or other exclusively online/web-based interventions for SUDs in correctional populations or settings. As a brief overview, one study included qualitative semi-structured interviews asking participants in an outpatient clinic with opioid use disorder (OUD) who engaged in treatment in jail/prison about their use of technology and their perspectives regarding digital interventions. Another study included a retrospective chart review of a virtual buprenorphine clinic that included at home induction of buprenorphine, and telemedicine/video conferencing among patients with OUD, of whom a large percentage had prior criminal justice involvement, including detention/incarceration in the last year. One distinct investigation recruited judges and invited them to participate in medication assisted treatment online modules to increase their knowledge and medication assisted treatment referrals. The remaining three studies examined the efficacy of

a breathing device to assist with breathing activities for treating SUDs in a male-only prison, an early computer program for heroin relapse prevention, and the economics of CBT4CBT for treating alcohol use disorder (AUD; reviewed in the CBT4CBT section). Overall, these studies indicated that the use of technology for SUD interventions in correctional settings is feasible, can effectively assist individuals in receiving care during treatment and is looked upon favourably.

The results of the second search yielded $k = 3$ studies examining the efficacy of the BFO intervention in correctional settings or individuals who were justice-involved. Additionally, two studies from other sources were found when reviewing BFO and CBT4CBT studies, with one qualitatively examining prisoners' experiences with the BFO intervention. The second examines the effectiveness of BFO during the COVID-19 pandemic for incarcerated individuals undergoing treatment for methamphetamine use. These studies are reviewed in the section on BFO. The third study by Kiluk et al. (2016) examining CBT4CBT4 efficacy for individuals with AUD, and was found from the original search of a study examining the economic costs associated with CBT4CBT (Kacmerek et al. 2021) that cited this study as it was from the same study sample (both are reviewed in the CBT4CBT section). Therefore, only one CBT4CBT economic evaluation study was found, however, other CBT4CBT studies are reviewed because of the relevance of the electronic intervention. In terms of geographic location, $k = 5$ were conducted in the United States, $k = 5$ were conducted in the United Kingdom, and $k = 1$ were conducted in Australia; no studies were conducted in Canada.

Table 1

Summary of Studies Investigating Electronic Interventions in Criminal Justice and Correctional Contexts

Author (Year)	Country	Sample Characteristics	Study Design/Intervention	Principal Findings
Barber et al. (1993)	Australia	30 prisoners (23 M, 7 F) with heroin use disorder (at least 3 years) and had been imprisoned for a heroin-related crime Individuals were randomized into standard treatment and standard treatment plus one session of the computerized relapse prevention program	Computer program, "Living Without Smack designed for heroin relapse prevention, focused on coping strategies when faced with high-risk situations. Individuals assessed at pre/post intervention, and 3 months follow up. Qualitative interviews with individuals who completed the 3 month follow up.	• Addition of the computer session to standard treatment enhanced self-efficacy short term, however at 3-month follow up there were not significant differences between groups in terms of self-efficacy for heroin use. • Specific differences: urges/temptations, social pressure to use, and negative physical states on the situational confidence questionnaire. • Qualitative interview (completed 2-months post-intervention) results showed no significant differences between groups regarding heroin use
Brzozowski et al. (2020)	United Kingdom	Participants recruited from a male only prison. Had to be imprisoned, have a history of an SUD, receiving pharmacological	Breathing device to assist with regulating breathing (thought to improve emotion regulation) visual aid for timed breathing, (6	• Positive outcomes as measured on the DASS, particularly for improvements in depressive symptoms and over half of participants reporting improvement or having recovered on the anxiety and stress subscales.

		management and recently experienced emotion dysregulation (e.g., outbursts, anxiety, low mood, etc.)	breaths per minute, 5s inhalation, 5s exhalation). Device had a built-in sensor connected to the finger that detects interbeat intervals of the heart. Completed 15 sessions. Qualitative interview (semi-structured regarding general experience and effects of the intervention)	• Less positive results for anger subscales, only one participant reported as recovered with all other participants showed no change. • Mixed results for mindfulness – some participants improved, some did not.
Elison et al. (2016)	United Kingdom	N = 32 adult prisoners who completed the Breaking Free Health and Justice (BFHJ) treatment and recovery program in prison 23-56 years, Average age = 35.5 years 29 Male 3 Female Substance-involved	Qualitative (semi-structured interviews, open-ended questions) Questions on current sentence and events that lead to incarceration, substance use history, and precipitating factors including life events. Interview on past and present mental health,	• Substance use, mental health difficulties, and offending were. significant issues among prisoners and the interplay of these issues are complex. • Mental health and offending were prevalent and accepted by prisoners as problems during adulthood, however, they did not provide a causal explanation for substance use. • Traumatic events experienced during childhood led to substance use for some as a coping mechanism.

		offenders in U.K. prisons receiving current treatment for substance misuse and comorbid mental health issues	previous and current support, and treatment received for both substance use and mental health issues. Interviews length 20 to 30 min and audio recorded using a digital Dictaphone	• Early childhood adversity such as abuse and neglect were reported • Multiple stressors and adversity were reported by prisoners as a contributing factor to substance use including experiencing bereavement, homelessness resulting in poor mental health. • Experiencing significant difficulties in accessing support for both mental health and substance use, and current prison sentence provided the first opportunity for treatment.
Elison-Davies et al. (2022)	United States	N = Two thousand one hundred and eighty-seven Ohio Department of Rehabilitation and Correction (ODRC) residents who engaged with digital CBT program for SUD, 'Breaking Free from Substance Abuse', to address methamphetamine use during the COVID-19 pandemic.	Quantitative within-subjects, non-randomized observational study Digital CBT program for SUD for prisoners to address methamphetamine use during the COVID- 19 pandemic Recovery Progression Measure (RPM) (levels	• A total of 1427 (65%) participants engaged with the program to address their methamphetamine use only, 695 (32%) to address their methamphetamine plus one other substance use, and 65 (3%) for their methamphetamine plus two other substances use. • Completion of Progress Checks were found to have a significant change in reductions in methamphetamine dependence (SDS), depression/anxiety (PHQ), and biopsychosocial impairment

The largest age group 25–34 years (896, 41%) 35–44 years (766, 35%) 45–54 years (236, 11%), 18–24 years (223, 10%) 55–64 years (48, 2%) The smallest age group 65 years and over (6, 0.4%) – 12 (0.6%) participants did not provide their age. 1416 (65%) Male 734 (33.5%) Female	of functioning in six biopsychosocial domains) Visual depiction of a theoretical CBT framework, the Lifestyle Balance Model (LBM) The LBM is based on the five-factor model used in CBT. 12 evidence-based behavioral change techniques (BCTs) Severity of Dependence Scale (SDS), Patient Health Questionnaire-4 (PHQ-4), Five items (1, 2, 17, 18, 20) from the World Health Organization Quality of Life measure (WHOQoLBREF), Recovery Progression Measure (RPM)	(RPM), and increased in quality of life (WHOQoL-BREF) • Those completed both a baseline assessment and a Progress Check gained significant reductions in scores for severity of substance dependence, depression/anxiety and biopsychosocial functioning impairment, and a significant increase in quality of life. • Psychosocial risk factors were significantly positive with most recent Progress Check scores. Interpersonal conflict was negatively associated with poorer mental health and quality of life outcomes with severe depression/anxiety, poorer quality of life and biopsychosocial functioning outcomes. • Participants who completed a Progress Check assessment completed more of the BCTs and components in the program than those that did not complete a Progress Check • Completion of the Difficult Situations component was significantly associated with better biopsychosocial functioning scores.

				• Completion of the Unhelpful Behaviors component associated with lower substance dependence, and better mental health and biopsychosocial functioning scores. • Completion of the Lifestyle component associated with better mental health, biopsychosocial functioning and quality of life scores.
Elison et al. (2017)	United Kingdom	N = 2311 individuals with an SUD Individuals came from specialist community-based substance misuse services (85.4%), 2.3% from inpatient detoxification settings, 7.1% (comprising 165 patients) in prisons, and 120 (5.2%) in community mental health services. 55% Male, 45% Female Mean age = 42.2 (range = 15-75) 95.2% white/British	Individuals completed a Breaking Free Online intervention alongside a baseline assessment including the Recovery Progression Measure (assessing biopsychosocial functioning), a Quality of life (QoL) measure, depressive/anxiety symptomology and severity of dependence scale. The intervention consisted of 6 modules targeting different facets of psychosocial	• Significant decreases in biopsychosocial functioning problems, depressive/anxiety symptomology, and alcohol/drug dependence symptoms (medium effect sizes) • Increase in quality of life, and recovery progression (small effect size) • Degree of change was associated with the number of modules completed. • Improvements were associated with specific modules: ○ Changes in depression and anxiety was associated with the number of times participants completed strategies in the emotional impact and negative thoughts modules.

			functioning (e.g., negative thoughts, unhelpful behaviours)	○ Changes in alcohol dependence severity was associated with lifestyle and negative thought module strategy practice. • Scores on drug dependence not significantly associated with the number of times strategies were completed in the modules. • Changes in QoL and biopsychosocial functioning were also associated with the number of strategies practiced. • Evidence of importance of dose • Evidence of tailored strategy practice to improve specific clinical outcomes.
Elison et al. (2016)	United Kingdom	Study 1: Qualitative interviews, N = 16 male prisoners Mean age = 35.5 (range = 23-56 years), all white/British. Mostly used heroin (43.6%) Study 2: Included quantitative pre-post data incorporating measures of biopsychosocial	Study 1: Asked prisoners' opinions on Breaking Free Online (BFO) intervention, including their opinions on the content and whether they felt it was useful for their treatment. Additionally, their use of coping skills and techniques from the BFO program	• Study 1: Prisoner's perceptions of BFO were largely positive regarding the programs potential to "build recovery capital" and provide continued care. Prisoners liked the structure of the program and also identified how they could translate the skills they learned into the community (e.g., coping skills) • BFO was thought to be beneficial for individuals who would not enjoy a traditional group format • Some prisoners stated their intention to continue using the program post-release

functioning, quality of life, and severity of dependence on alcohol/other substances Frequency of substance use the week prior to baseline was also collected. N = 85 prisoners had pre and post data, all male, average age 34.8 (range = 21-50), majority white/British (87.1%)	Study 2: Significant changes in quality of life, and self-reported weekly alcohol and substance use.	• Some prisoners still had anxiety surrounding release into the community, although they recognized the importance of increasing recovery capital • Study 2: No significant change identified for biopsychosocial functioning, although for specific items: improvements in negative thoughts, physical sensations, ability to cope with difficult situations • Significant increase in quality of life, and decrease in severity of dependence • Effect sizes were greatest for decreases in the frequency of alcohol and substance use • Time elapsed between baseline and follow up (i.e., # of weeks of engagement with the program) was associated with degree of change in QoL, but not the other measures • Time elapsed between baseline and follow up was associated with difficult situations item, and the negative thoughts item, and emotions item on the biopsychosocial measure • Given the wide age range, age was also examined as a predictor for degree of change in the outcome variables. QoL,

				severity of alcohol dependence, and units of alcohol consumed were not associated with age, however change in other substance dependence and biopsychosocial functioning were sig. associated with age, with the degree of change being sig. positively correlated with age.
Garvey et al. (2021)	United Kingdom	N – 466 males from Prison in North West England Mean age = 35.6 (range = 18-60)	High risk offenders recruited to the Pillars of Recovery group (PoR; *n* = 134) Low risk offenders competed Breaking Free Online intervention (BFO; *n* = 332) Assessed Quality of Life (QoL), severity of dependence biopsychosocial functioning, pre and post intervention Individuals recruited from 10 prisons, categories A-D	• Individuals who did and did not complete pre- and post- measures differed on pre-treatment dependence severity, those with post-treatment data had higher scores • At baseline, the groups differed on quality of life, with the PoR group reporting higher scores, and on biopsychosocial functioning with the PoR group reporting higher scores • Both groups showed significant differences on QoL from pre- to post-treatment. • The PoR group had higher rates of improvement in QoL • Both groups had significant decreases in dependence severity, independent of the group they were a part of • Both groups showed significant decreases in impairment of biopsychosocial functioning, however, a sig. interaction showed that the PoR

			Breaking free Online was comprised of 8 weeks of online sessions (1 hour each) Participants in Pillars of Recovery completed 12 2-hour sessions in small groups led by a facilitator in person, including 1 individual 30-minute session each week	group, but not the BFO group showed sig. decreases in their functioning from pre to post scores
Kacmarek et al. (2021)	United States	63 out of N= 68 participants began treatment Treatment as usual (TAU) = 19 CBT4CBT+TAU = 20 CBT4CBT+monitoring = 24) Only 63 out of N= 68 participants began treatment	The Structured Clinical Interview for DSM-IV (SCID-IV) The Substance Use Calendar, a calendar-based Timeline Follow-Back method The Addiction Severity Index (ASI) administered before randomization, every 4 weeks during treatment, and at 1-, 3-, and 6-month follow-up	• Protocol treatment costs per participant was highest for CBT4CBT+TAU, then CBT4CBT+monitoring and lastly TAU • 42% indicated utilizing non-protocol healthcare services during the 8-week treatment period with no significant differences in the total of non-protocol treatment costs and individual categories of non-protocol treatment costs • Both at the end of treatment and at 6-month follow-up, it costed more to implement CBT4CBT + TAU than TAU alone due to it's higher efficacy

			Breathalyzer and urine toxicology screenings The Program and Client Costs-Substance Abuse Treatment form (PACC-SAT)	
Kiluk et al. (2016)	United States	Participants recruited from the Substance Abuse Treatment Unit of an outpatient substance abuse treatment facility in New Haven N=68 Treatment as usual (TAU) N = 22 TAU plus CBT4CBT N = 22 CBT4CBT plus monitoring N = 24	Participants assigned to one of the 3 treatment conditions for 8-weeks Standard treatment as usual (TAU): Weekly group or individual psychotherapy TAU plus CBT4CBT (TAU+CBT4CBT): Standard treatment in addition to access to the web-based CBT4CBT program CBT4CBT plus brief clinical monitoring (CBT4CBT + monitoring): CBT4CBT virtual stand-alone	• Quarter of the sample reported being referred for treatment by the criminal justice system • 63 individuals initiated treatment (i.e., attended at least 1 session), 33 completed the treatment protocol (52%). Also, those in either of the CBT4CBT groups had a higher likelihood to complete treatment compared to those in TAU • 62 participants (91%) completed the final follow-up interview 6 months • Most participants (88.4%) reported completing at least 1 of the 6 homework assignments • For the full intention to treat (ITT)

			treatment. Participants completed 1 CBT4CBT module each week on-site based treatment, in combination with brief (10-minute) weekly clinical monitoring in-person Participants assigned to this (or any other condition) were also offered standard ancillary services provided by the treatment facility, which included psychiatric, pharmacologic, and emergency services	sample (i.e., the total sample of N = 68) an overall increase in abstinence during the 8-week period was observed. Significant abstinence levels in TAU + CBT4CBT group • Overall decrease in heavy drinking during the 6-month follow-up period
Langdon et al. (2022)	United States	N = 8 Recruited from an outpatient clinic who previously had engaged in medications for Opioid Use Disorder (MOUD) in jail/prison	Qualitative semi-structured interviews asking participants about: 1) the use of technology (computers, cellphones), history in engaging in MOUD,	Major themes for feasibility/accessibility: • Individuals are receptive to motivational and distress tolerance based digital health intervention • Privacy is not a concern for text message-based interventions

Age: 18+ (47.4) range = 18-56 years 7 Male, 1 Female Medications: methadone, suboxone 6 white/Caucasian 1 mixed ethnicity 1 black/African American	barriers/facilitators to using MOUD while in jail/prison and following release, precipitating factors to using substances, perspectives surrounding utility and delivery mode of proposed intervention, and thoughts surrounding digital health interventions Proposed intervention (2 weeks prior to release): In-person, clinician delivered: initial intervention phase, discussing the advantages/disadvantages of continued behaviour change, how to manage stress, triggers, psychological discomfort 2nd phase: text-messaging (3 months post release):	• Participants are able to obtain a cell phone, however concerns of cell phone service and digital health literacy Major themes for structure: • Intervention should include both automatic and on demand messages (consistent messaging) Initial intervention should be delivered prior to release (during incarceration, help with future planning, incorporate part of discharge plan)

			Promote ongoing engagement in MOUD, skills training, motivational messages, asking individuals how they feel day to day, and whether they have had any cravings/urges followed by skills recommendation	

Tofighi et al. (2022)	United States	N = 78 patients with Opioid Use Disorder Eligible for enrollment in the New York City (NYC) Health+Hospitals Virtual Buprenorphine Clinic
		N = 11 from the NYC Health + Hospital jail re-entry program
		
		65 Male, 14 Female
		37 had prior criminal justice involvement
		25 had past year detention/incarceration
		White – 34%
		Black – 19%
			Retrospective chart review
			Telemedicine
			Initial visit: 30-45 min video conferencing, providers reviewed instructions on home induction of buprenorphine, send a PDF of home induction pamphlet via email, referrals to telemedicine primary care providers, and prescribed buprenorphine-naloxone (BUP-NX) and naloxone to a community pharmacy
				• Outcomes at 2 months:
				  ○ 42 patients remained in the telemedicine program, 21 were successfully transitioned to a community treatment program, 15 were lost to follow-up
				  ○ 29 patients prescribed naloxone during their initial visit
				• Absence of adverse clinical outcomes, n = 8 experienced withdrawal symptoms, and one non-fatal opioid overdose
				• Some patients experienced problems receiving buprenorphine from the pharmacy (n = 17) due to insurance coverage, pharmacy unavailability, or difficulties with electronic prescribing

Hispanic – 37%
Other – 15%

Studies in Criminal Justice Settings from the Primary Search

In as early as 1993, a computerized relapse program was implemented for individuals who had heroin use disorder and had been incarcerated for a heroin-relate crime (Barber, 1993) . The computer program, "Living Without Smack," was designed for heroin relapse prevention and focused on coping strategies when faced in high-risk situations (e.g., triggers, cravings). The basic premise follows the relapse prevention model proposed by Marlatt and Gordon (1985), which posits that when individuals are not able to use coping strategies in high-risk situations, they experience a decrease in self-efficacy, ultimately leading to lapse and relapse (Marlatt & Donovan, 2008). As such, the program was designed to increase coping skills to enhance self-efficacy. Individuals (N = 30 prisoners) completed the program and were assessed on self-efficacy using the Situational Confidence Questionnaire (SCQ). Individuals were randomly assigned to treatment and control conditions, in which the control condition included standard drug unit programming, and the treatment group additionally engaged in Living Without Smack. Individuals completed the SCQ at pre/post-intervention and approximately 3 months later. Only 13 individuals were contacted successfully at the 3-month mark, and they were also interviewed about their opinions of the drug unit program and current patterns of heroin use. They found that individuals in the Living Without Smack group experienced a significant increase in self-efficacy in comparison to the control group that was short-term (from pre- to post-intervention, but not at three months), specifically in the urges/temptations, social pressures to use, and negative physical states subscales of the SCQ. However, at the 3-month mark, there were no significant group differences. Data from individuals who engaged in the interviews, found no significant differences between groups in heroin use at 3-months post-intervention. This study showed that even a simple computerized add-on using comparatively primitive technology may enhance self-

efficacy in the short-term compared to treatment as usual, although longer-term clinical effects probably require more intensive intervention (Barber, 1993).

Langdon et al. (2022) examined the feasibility of a digital intervention targeting OUD for individuals ($N = 8$) who were released from jail/prison and engaging in outpatient treatment. Semi-structured qualitative interviews were also conducted with individuals to gain their perspectives on digital interventions, their use of technology, and their experiences with engaging in medication use for OUD (MOUD) and barriers/facilitators to using MOUD while in jail/prison and following their release. The proposed intervention combined an in-person and text-messaging component to target distress tolerance skills and incorporated motivational enhancement, and adaptive strategies for coping with cues/triggers. The in-person component occurred 2 weeks prior to the prisoners' release into the community, which would be a clinician delivered initial intervention phase including discussion of the advantages/disadvantages of continued behavioural change, how to manage stress, triggers, and distress. The second phase would include text-messaging to promote ongoing engagement in MOUD, reminders for skills training, and incorporated motivational messages, including asking how individuals how they feel and whether they have experienced any cravings or urges, followed by skills recommendations.

The results contained two major themes falling under the acceptability and feasibility of computer-based intervention: individuals were receptive to motivational and distress tolerance based digital health interventions, and participants felt that the content and length of the intervention was easy to follow, understand, read, and comprehend. Additionally, privacy concerns were not an issue with the digital format for participants. A theme of digital literacy and accessibility was apparent, with participants having no concerns with accessing a cell phone,

however, they identified concerns of cell phone service and digital health literacy. Regarding the intervention, two major themes emerged. The first included that the intervention should include both automatic and on demand messaging, providing consistency for the participants. Second, there was a preference for the intervention to begin before release, to assist with future planning and incorporating it into individuals' discharge plans (Langdon et al., 2021).

Brzozowski et al. (2021) demonstrated that the use of electronic interventions coupled with electronic devices can be implemented in an innovative way for those in correctional settings. Participants ($N = 7$) in their study included individuals who had been incarcerated with a history of an SUD and were receiving pharmacological treatment. Individuals who were experiencing high emotion dysregulation (e.g., temper outbursts, anxiety, depressed mood) were recruited to participate. The intervention consisted of a 6-week long (15 sessions) of regulated breathing, which has been shown to improve emotion regulation via a breathing device. The device included a sensor that, when applied to the finger, detects interbeat intervals of the heart. Breathing patterns were graphically depicted on a laptop screen, and individuals were also prompted to adjust their pattern of breathing if it did not match up with the visual aid. Individuals were assessed on emotion regulation abilities, depression/anxiety/stress, state/trait anger, and mindfulness. Additionally, participants who completed all 15 sessions participated in an interview to gain their perspective on the efficacy of the intervention. The findings revealed that individuals experienced a significant decrease in depressive symptoms, and over half of the participants reported improvement/recovery on anxiety and stress levels. Regarding anger, individuals did not significantly improve, with only one participant showing improvements. Regarding mindfulness, the findings were mixed, with a subgroup notably improving.

The qualitative interviews revealed a high level of agreement with the quantitative findings

as individuals reported decreases in worry, ruminative thoughts, and anxiety. Some participants mentioned self-control with improvements in temper as an example. Each participant also reported using the breathing techniques outside of the intervention. Two participants expressed negative attitudes toward the intervention. For example, one participant mentioned feeling anxious when taking deep breaths (asphyxophobia), and another participant shared that they didn't find the course as good because they felt that there were only short-term benefits of the exercises. The authors mentioned a few factors that influenced the delivery of the intervention. For example, some participants had limited knowledge on how to operate a laptop, and often needed additional guidance. Another participant mentioned that they needed to "get into the zone" to be able to focus, and one participant wished that the intervention was longer. Additionally, some participants were restricted to their cells due to altercations or had medical appointments, and had to do chores/routine activities at the time of the session, which impacted the individuals' experience with the intervention. Some participant's sentence length changed during the intervention, which also impacted their experience (e.g., with regards to their mood or having to stay in their cell). Staff availability and understanding of the aims of the intervention was also a factor, including availability to sign the equipment out and escort participants to sessions (Brzozowski et al., 2021).

Focusing on telemedicine rather than a digital intervention per se, Tofighi et al. (2022) conducted a retrospective review of individuals undergoing OUD treatment in a virtual buprenorphine clinic during the initial phase of the COVID-19 pandemic (March to May 2020). Of the $N = 78$ individuals in the study, $n = 11$ individuals were referred from the New York City Health and Hospital jail re-entry program. Additionally, among the sample, 37 individuals had a prior criminal justice involvement, with 25 being in detention/incarceration in the last year.

Individuals underwent an initial telemedicine appointment with providers reviewing instructions for at home induction of buprenorphine, including sending virtual documents such as a pamphlet, referrals to telemedicine primary care providers, and virtual prescription of buprenorphine/ naloxone to a community pharmacy. Examining outcomes of this program at two months, 42 individuals remained in the program, with 21 individuals successfully transitioning to a community treatment program, and 15 lost to follow-up. There were no adverse clinical outcomes, however eight individuals experienced withdrawal symptoms and one experienced a fatal opioid overdose. Some of the patients (n = 17) experienced problems receiving the buprenorphine prescription from their pharmacy due to insurance coverage, availability, and difficulties associated with electronic prescribing. Overall, the results of this naturalistic study demonstrate the feasibility of the telemedicine based opioid treatment program. Providers and other individuals in the participants' care team could be electronically connected while individuals engaged in electronic interventions (Tofighi et al., 2022).

Breaking Free Online

Breaking Free Online (BFO) is an electronic intervention that was developed in the United Kingdom to address SUD concerns and mild to moderate co-occurring mental health conditions (e.g., depression/anxiety). The program has been implemented in a wide range of settings including community-based addiction services, dual diagnosis services, eTherapy services, and, to a limited extent, prisons. Although data from prison and criminal justice settings more broadly are limited, the clinical effectiveness of BFO has been evaluated in other settings and populations. BFO is an online tool that can also be used on a smartphone, and is available whenever individuals want to access the program, as it is self-directed/self-paced. Advantages of BFO relative to in-person treatment are its flexibility and accessibility for individuals who are on

treatment waitlists or incarcerated individuals who are unable to access other treatments.

The program's focus is on relapse prevention and on practicing behavioural change techniques to guide clients to identify coping strategies when faced with high-risk situations. This includes key cognitive-behavioural techniques including cognitive restructuring and mindfulness-based interventions. Guidance is also provided on anticipating high risk situations and planning to mitigate risk for substance use. The smartphone-based app allows for individuals to receive messages reminding them of coping strategies in real time. Individuals are also able to navigate through skills on their personal dashboard, and visually track their progress and substance use. This program has the potential to be well-suited for individuals in prison settings due to its person-centered approach, accessibility, feasibility of implementation (particularly in comparison to other methods in prison settings) and effectiveness. One consideration is that the use of cell phones may not be allowed in certain correctional institutions, therefore the phone may need to be issued by Correctional Services or individuals may be provided with the program on a tablet without access to other applications. Indeed, this aspect may only be relevant to post-release settings where smartphone access is sanctioned.

Prior research from the United Kingdom demonstrates that for individuals with OUD, BFO resulted in significant reductions in use, SUD severity, and mental health disorders (Elison-Davies, Märtens, et al., 2021). Individuals also experience improvements in quality of life (Elison-Davies, Märtens, et al., 2021). Additionally, BFO shows promise for individuals experiencing SUDs in the broader community, with the program assisting individuals with reducing substance use or achieving abstinence (Elison et al., 2014). Individuals accessing the *Change Grow Live* program in the United Kingdom (a charity that offers assistance with drug use, housing, criminal justice issues, etc.) who engaged in BFO showed a dose-dependent

response, such that greater engagement was associated with better outcomes. Additionally, individuals exhibited improvements in weekly drug use, severity of alcohol and drug dependence, depressive/anxiety symptomology, and quality of life from pre- to post- treatment (Elison-Davies, Hayhurst, et al., 2021).

In terms of criminal justice settings, the first study from the secondary targeted search included a diverse sample of $N = 2311$ individuals from specialist community-based substance misuse services, inpatient detoxification settings, community mental health services, and also prisons ($n = 165$). At baseline, individuals were assessed on biopsychosocial functioning, quality of life, depressive/anxiety symptomology, and severity of dependence. Individuals completed the intervention which was comprised of six modules corresponding to the six domains of the biopsychosocial assessment. Individuals were re-assessed at a mean of 8.2 weeks from baseline. Individuals experienced significant reductions in problems with biopsychosocial functioning, depressive/anxiety symptomology, and alcohol/drug dependence symptoms, at medium effect sizes. Individuals also experienced increases in quality of life and recovery progression to a smaller degree (as evidenced by small effect sizes). The degree of change individuals experienced was significantly associated with the number of modules completed, such that improvements or decreases in symptoms were larger for those who completed more content. Improvements in symptoms were also found to be associated with engaging with specific modules. For example, changes in depressive/anxiety symptoms were associated with the number of times participants completed strategies in the emotional impact and negative thoughts modules, which target mindfulness and cognitive restructuring, respectively. Additionally, change in alcohol dependence symptoms was associated with lifestyle (targeting goal setting) and negative thoughts modules. However, drug dependence was not significantly associated with

the number of times strategies were completed in the modules. Changes in quality of life and biopsychosocial functioning were also associated with the number of strategies completed, further underscoring the dose-dependent response that is associated with completing modules in BFO (Elison et al., 2017). These data suggest that strategy practice can be tailored to target specific symptoms and areas of functioning. On balance, the outcomes reported were favourable but only a minority of participants were from a prison setting and their specific outcomes were not available.

A second study included individuals from a prison in the North of England. Incarcerated individuals (n = 134) completed a Pillars of Recovery group (an intervention with similar principles as BFO, but completed in person with a clinician for offenders deemed at being high-risk to re-offend), whereas individuals categorized as low risk to re-offend (i.e., low-risk offenders) completed BFO (n = 332) (Garvey et al., 2021). Individuals were assessed on quality of life, severity of dependence, and biopsychosocial functioning. Individuals who were missing post-treatment measures differed from those with both timepoints on pre-treatment dependence severity, with those with post-treatment data having higher scores of dependence at treatment onset, suggesting some differential attrition. At baseline, the groups significantly differed with regards to quality of life and biopsychosocial functioning (with the Pillars of Recovery group reporting higher scores). Both groups, however, showed significant increases in quality of life from pre- to post-treatment. Both groups also had significant decreases in dependence severity, meaning that they were both able to achieve improvements in their substance use independent of what group they were in. Additionally, both groups showed decreased impairment in domains of biopsychosocial functioning (Garvey et al., 2021). These results highlight that BFO, particularly for low-risk offenders, is associated with reduced substance use, increasing quality of life and

biopsychosocial functioning, albeit without a rigorous control group such as in a randomized controlled trial design. The program could presumably also prepare and assist individuals with transitioning back into the community following release.

During the COVID-19 pandemic, Elison-Davies et al. (2022) conducted a study using data from 2187 Ohio prison residents who engaged with BFO. The delivery of BFO for these individuals revealed 65% of individuals engaged with this program for methamphetamine use, 32% for methamphetamine use in addition to one other substance, and 3% for methamphetamine use in addition to two other substances (Elison-Davies et al., 2022). Using the progress check within the program as a benchmark, it was reported 53% of the incarcerated populations completing a progress check had a significant effect in decreased methamphetamine dependence, depression/anxiety, biopsychosocial impairment and increased quality of life (Elison-Davies et al., 2022). A positive association between psychosocial risk factors and progress check scores were also observed. While evaluating the determinants for poor scores within the mental health domain, it was found that interpersonal conflict and severe depression-anxiety had an association with poor mental health/quality of life and biopsychosocial functioning scores respectively (Elison-Davies et al., 2022). There are twelve evidence-based behavioural change techniques (BCTs), and for those who completed a progress check were found to have completed more BCTs components in comparison to those who did not complete a progress check (Elison-Davies et al., 2022). The following outcomes were inferred based on the components accomplished: completion of Difficult Situation component resulted in better psychosocial functioning, completion of Unhelpful Behaviours component had a significant reduction in substance dependence and increase in mental health and biopsychosocial functioning. Particularly, the completion of the Lifestyle component had a significant effect on mental health, biopsychosocial

functioning, and quality of life (Elison-Davies et al., 2022).

Several studies incorporated qualitative methods to capture prisoners' thoughts about BFO. Elison et al. (2016) conducted a mixed-methods investigation incorporating both qualitative (i.e., semi-structured interviews with 16 male prisoners who had undergone BFO), and quantitative analyses (examining pre- post- intervention data for 85 individuals who completed BFO). Qualitative interviews focused on: 1) individuals' views on the BFO intervention, including the clinical content, whether they felt the program was effective for their treatment, and thoughts on continued recovery and how skills learned in BFO may assist with their transition back into the community. Quantitative analyses focused on changes in the same variables as other studies by Elison and colleagues, including biopsychosocial functioning, quality of life, and severity of alcohol/substance use dependence. Frequency of substance use the week prior to baseline was also collected, as well as self-reported weekly alcohol/substance use. Results from the qualitative analyses depicted that prisoners had a positive impression of BFO, highlighting the potential of the program to "build recovery capital" and provide continued care. Individuals liked the structure of the program and identified how they could translate the skills they learned into the community.

One participant highlighted the benefit of the online format, stating:

> "*I don't think I'd wanna sit in a room with a load of people I don't know, and tell them my deepest, darkest secrets. [The group] expect me to open up and people getting stabbed, sliced and everything else, when you open up*."

This highlighted that maintaining a level of anonymity and independence while completing the intervention was an important component of treatment. Additionally, regarding continuity of

care, participants noted that they would intend to use the program even after they were released into the community.

Another participant shared:

> "*When I get home, I'll go on it from time to time, just to reboost myself*."

A third participant shared:

> "*People who are coming up to their release and started it, in here with a few weeks [...] have said they've used it when they've got out*."

Despite using the program, however, prisoners also shared some anxieties surrounding drug use following their release. Individuals identified how high-risk situations could be mitigated using coping strategies that could be used, however they were still anxious that release into the community and being outside the prison environment could lead to using substances. Regarding recovery capital (i.e., existing resources to support successful recovery), individuals identified that getting a job and securing accommodation were important factors for their recovery outcomes following release. Therefore, BFO in conjunction with assisting individuals with securing employment and housing could enhance recovery. Regarding the quantitative findings, no significant change was identified for biopsychosocial functioning from pre- to post-intervention, although there were significant improvements in specific items, such as negative thoughts, physical sensations, and ability to cope with difficult situations. Frequency of alcohol and substance use significantly decreased (large effect sizes), and individuals experienced a significant decrease in severity of dependence (large effect size for alcohol, moderate for other substances) and an increase in quality of life (moderate effect size). The time elapsed between

baseline (pre-intervention) to follow-up (i.e., how many weeks individuals engaged with the program) was associated with the degree of change in quality of life, but not the other measures. Interestingly, the degree of change was significantly and positively associated with age (Elison, Weston, Davies, et al., 2016). These findings suggest that BFO is an effective treatment for reducing substance use severity and frequency, and further provides evidence for the dose-dependent relationship between using the program more frequently with certain outcomes such as quality of life.

A qualitative study conducted in the United Kingdom examined the association between substance use and mental health utilized semi-structured interviews among a sample of (n = 32) prisoners who reported endorsing substance use at an early age (i.e., late childhood/early adolescence) to cope with distress/stress, trauma, and mental health issues (Elison, Weston, Dugdale, et al., 2016). As reported in Elison et al. (2016), medication was offered as the first line of treatment for substance use, however, psychosocial rehabilitation and detox were preferred. Furthermore, it was found that barriers to access resources and treatment within the healthcare system compelled prisoners to engage in crimes that lead to being incarcerated providing access to treatment within criminal justice settings (Elison, Weston, Dugdale, et al., 2016). For the majority of the sample, it was revealed criminal justice settings served as a catalyst resulting in a positive change, enabling them to access treatment (Elison, Weston, Dugdale, et al., 2016). It was further confirmed the Breaking Free Health and Justice (BFHJ) treatment program had a positive effect therapeutically that helped participants' to better understand substance use and mental health challenges, however, it also provoked anxiety about leaving the prison and transitioning back into the community (Elison, Weston, Dugdale, et al., 2016). The intervention prompted prisoners to think and process emotions effectively while many reported their anxieties

to transition into the community was alleviated due to the coping skills and strategies gained in BFHJ (Elison, Weston, Dugdale, et al., 2016). For the majority of the prisoners, it was found that the interplay of substance use, mental health challenges, and crime are inter-related within its own complexity (Elison, Weston, Dugdale, et al., 2016). The prevalence of mental health and crime together exists, and are perceived as problems among prisoners, however, they are not a direct cause for substance use (Elison, Weston, Dugdale, et al., 2016). Further research is required to examine this risk. Precipitating risk factors contributing to substance use among prisoners included stressful and adverse life experiences such as bereavement, homelessness, etc.

Collectively, although most of the research to date is in non-correctional settings and uses observational designs, BFO nonetheless has notable promise for use in Canadian correctional and post-release settings.

Computer-based Training for Cognitive-Behavioural Treatment

None of the results from the primary search contained studies examining outcomes for offender/criminal justice involved individuals receiving Computer-based Training for Cognitive-Behavioural Therapy (CBT4CBT). Nonetheless, given its extensive evidence base, CBT4CBT represents another promising electronic SUD intervention that may have clinical utility in prisons and criminal justice settings. CBT4CBT was developed by Dr. Kathleen Carroll at Yale University, and is web-based version of Cognitive Behaviour Therapy (CBT) for substance use disorders (Carroll et al., 2008). It is designed to be user friendly and does not require any prior computer experience or reading skills (as text is read by narrator) (Carroll et al., 2008). Across its modules, CBT4CBT incorporates multimedia style with computer educational games, graphic designs, animation, quizzes, interactive videos and audio voice-overs, modelling and imparting knowledge on skills and strategies (Carroll et al., 2008, 2014; Mallorquí-Bagué et al., 2023)

In terms of program structure, CBT4CBT comprises six modules that encompass understanding and changing patterns of substance use, coping with craving, refusing offers of drugs and alcohol, problem solving skills, identifying and changing thoughts about drugs and alcohol, and improving decision-making skills (Carroll et al., 2008). A brief description is provided during the first module, and after completion of this module participants are able to select the modules they wish to access in the order they prefer and complete them as many as time they wish (Carroll et al., 2008). Each module in CBT4CBT begins with introducing the key concepts, portraying a short video describing an individual being offered drugs or needing to cope with challenges surrounding substance use (Carroll et al., 2008). Following this, core skills to avoid substance use are introduced that are implemented by the characters highlighting the importance of CBT skills (Carroll et al., 2008). Knowledge and skills gained in the modules are

reinforced in additional videos that enables participants to view supplementary videos depicting characters engaging in assertive versus aggressive versus passive communication (Carroll et al., 2008). Additionally, each module contains a short vignette and an interactive video with a narrator providing knowledge on utilizing skills that assisted them to avoid substance use and the application of skills to address other issues (Carroll et al., 2008). Last, each module consists of a narrator reviewing all skills and strategies acquired, demonstration of homework completion and provides assignment with a reminder sheet (Carroll et al., 2008).

In terms of the efficacy of CBT4CBT in randomized controlled trials, Carroll et al. (2008) found participants in the CBT4CBT group had significantly reduced positive urine drug screen tests for any drugs (Carroll et al., 2008). Those in the CBT4CBT group also had a longer periods of abstinence while in treatment in comparison to those in treatment as usual (Carroll et al., 2008), although no differences were found between the two groups (CBT4CBT and TAU) for overall self-reported abstinence for all illicit drugs and alcohol (Carroll et al., 2008, 2014). While investigating treatment outcomes, it was reported cocaine use outcomes were more favourable among the CBT4CBT group in comparison to treatment as usual alone, with significant differences in abstinence from cocaine observed in the intention to treat sample compared to the CBT4CBT group (Carroll et al., 2014). As noted, decreased consumption of cocaine was observed among those assigned to the CBT4CBT group in comparison to treatment as usual from baseline until the 6 month follow-up (Carroll et al., 2014).

Several studies have examined the mechanisms of CBT4CBT and its efficacy in other populations. Roos et al. (2020) examined the short- and long-term effects in substance-related coping as a result of CBT in two different trials (in-person and/or computerized CBT for SUD). The first trial comprised of (N = 137) individuals with drug and/or alcohol use disorders

randomized to one of the following: in-person CBT, computer-delivered CBT (CBT4CBT) plus brief monitoring, or treatment-as-usual (TAU). The second trial (N = 68) individuals with an alcohol use disorder randomized to one of the following: CBT4CBT plus brief monitoring, CBT4CBT plus TAU, or TAU only. In both trials, Roos et al. (2020) concluded no significant effects were present in short-term coping, however, positive results were observed in terms of long-term coping (Roos et al., 2020). In the first trial, it was revealed long term changes in coping were related to the effects of CBT4CBT relative to TAU, but not in-person CBT at the 6 month follow-up for drug or alcohol use (Roos et al., 2020). In a study investigating the benefits of CBT4CBT for individuals with alexithymia (i.e., difficulties with identifying, describing, and expressing emotions), no significant change in the level of alexithymia during the study treatment and at follow-up, nor were differences observed in alexithymia level based on gender, employment, or by DSM-IV Axis I disorder substance use disorders, or anxiety disorders (Morie et al., 2015). These results do not suggest differential benefits for individuals with alexithymia and that CBT4CBT may be broadly useful in clinical populations. Most recently, investigating the feasibility of CBT4CBT in residential treatment among women with SUDs, Kelpin et al. (2022) found that those in the CBT4CBT group had a decreased likelihood of relapse, increased time to relapse, and lesser number of days of endorsing substance over the 3-month follow-up in comparison to treatment as usual group (Kelpin et al., 2022).

Given its electronic structure, program engagement is an important way to determine the efficacy of the program, as individuals who fully engage would be expected to exhibit the greatest benefit. Evaluating this as measured by adherence to the program, Tetrault et al. (2020) found that of N = 30 participants in CBT4CBT, 77% completed at least one CBT4CBT session, and of those who completed at least one session 78% completed some homework. Further, it was

shown that participants preferred to complete CBT4CBT in diverse settings as 44% completed sessions at home, 44% at the clinic, and 12% completed both at home and in the clinic (Tetrault et al., 2020). Reasons reported for accessing CBT4CBT in the clinic was that it provided a quieter environment without distraction as compared to their homes. Notably, diverse electronic platforms were also used, as 61% accessed CBT4CBT on a desktop, 22% on a laptop, 26% on a tablet, and 26% on a smart phone (individuals could access via one or more modalities) (Tetrault et al., 2020), suggesting accessibility via multiple modalities is a strength of the program.

The search initially revealed one study economically evaluating a CB4CBT intervention, which included a subsample of individuals with a criminal-justice background. Kacmarek et al. (2021) investigated the cost dissemination and implementation of CBT4CBT implemented by Kiluk et al. (2016), finding protocol treatment costs was highest for CBT4CBT + TAU followed by CBT4CBT + monitoring and TAU (Kacmarek et al., 2021). It was noted the determinant for increased costs of CBT4CBT + TAU was due to participants spending an increased amount of time in this treatment condition compared TAU and CBT4CBT + monitoring (Kacmarek et al., 2021). No significant differences were found in the total of non-protocol treatment costs and individuals groups of non-protocol treatment costs after utilizing non-protocol treatment services such as outpatient substance use/menta health treatment, and inpatient medical treatment between all groups (Kacmarek et al., 2021). At the end of the treatment an additional cost of $35.08 per participant was spent for CBT4CBT + TAU in comparison to TAU alone since CBT4CBT + TAU has higher efficacy resulting in a decrease of one drinking days per month (DDMs) (Kacmarek et al., 2021). By the same token, at the 6 month follow-up it costed $46.77 to administer CBT4CBT to TAU for a decline in one DDM due to the effectiveness of CBT4CBT + TAU than TAU alone (Kacmarek et al., 2021). More than half of the participants in

the TAU group, in comparison those in the CBT4CBT groups, utilized an increased amount of non-protocol healthcare services resulting in higher costs for TAU (Kacmarek et al., 2021). Given that participants in the CBT4CBT group completed a higher number of treatment sessions, positive abstinence outcomes were observed at the end of the treatment protocol in those assigned to the CBT4CBT group compared to TAU (Kacmarek et al., 2021).

From this study, we found a study that utilized CBT4CBT to address AUD, where a quarter of the sample was referred for treatment by the criminal justice system (Kiluk et al., 2016). Evaluating treatment retention and completion, a total of 63 (out of 68) individuals initiated treatment by attending at least 1 session, and 52% completed the treatment protocol (Kiluk et al., 2016). Also, participants in either of the CBT4CBT groups had a higher likelihood to complete the treatment protocol compared to those in TAU (Kiluk et al., 2016). Moreover, participants in TAU who initiated treatment (n = 63) attended a mean of 2.8 group sessions and 1.4 individual sessions, while those in TAU + CBT4CBT attended a mean of 3.1 group sessions, 2.0 individual sessions, and completed a mean of 5.6 of the 7 CBT4CBT modules, and finally participants assigned to the CBT4CBT + monitoring condition completed an average of 5.4 of the 7 modules offered and attended 5.0 sessions of brief clinical monitoring (Kiluk et al., 2016). Ninety-one percent of the participants completed the final 6 month follow-up (Kiluk et al., 2016). A majority of the participants (88.4%) indicated completion of at least 1 of the 6 homework assignments (Kiluk et al., 2016). An overall increase in abstinence was found among the full Intention To Treat (ITT) sample during the 8-week period of the study with significant levels of abstinence observed in the TAU + CBT4CBT group as compared to TAU (Kiluk et al., 2016). Considering the change in percentage of heavy drinking days (PHDD), a decline in heavy drinking was significant for participants in the TAU + CBT4CBT group, but not in the

CBT4CBT + monitoring group (Kiluk et al., 2016). The primary and secondary indicators of drinking at the 6 month follow-up suggested an increase in the percentage of days abstinent (PDA) and a decrease in percentage of heavy drinking days (PHDD) across all three groups: TAU, TAU + CBT4CBT, and CBT4CBT + brief monitoring (Kiluk et al., 2016). Lastly, an overall decline in heavy drinking was inferred at the 6 month follow-up (Kiluk et al., 2016).

On balance, although it has not been validated in correctional or post-release settings, given the sizable evidence base in support of CBT4CBT, it is a promising electronic SUD intervention in the criminal justice context.

Discussion

The goal of the current review was to survey the empirical literature on the use of electronic interventions to address SUDs in the criminal justice system. What emerged was a small number of quite heterogeneous studies that were both promising and limited in terms of implications and applications to the Canadian correctional systems. In general, there was considerable early-stage 'open-label' (uncontrolled) intervention trials that showed positive short-term benefits in terms of self-reported substance use, self-efficacy, and reduction in depression/anxiety symptoms (Barber et al., 1993; Brzozowski et al., 2020; Garvey et al., 2021; Elison et al., 2017; Elison-Davies et al., 2022). Although there was heterogeneity across interventions, the most common intervention was BFO and most of the studies used a cognitive-behavioural framework. These studies were complemented by qualitative and mixed-methods studies that found favourable perspectives toward electronic interventions among offenders. Although there were no studies of CBT4CBT in correctional settings, the large existing evidence base in community and clinical settings suggests it is another promising electronic intervention for SUDs.

These were generally early-stage feasibility/proof-of-principle studies, but were nonetheless supportive in those capacities. None of the studies were randomized controlled trials and a number had significant methodological limitations, such as very small sample size or very high attrition, which tempered confidence in the findings. None of the studies were conducted in Canada so the generalizability to the Canadian criminal justice system is unclear. However, the United Kingdom, United States, and Australia are comparable nations to Canada (i.e., developed world, high-income, English-speaking), which mitigates this concern somewhat.

On balance, these findings suggest that electronic interventions for SUDs have substantial

promise in Canadian criminal justice settings and could have several applications. First, electronic interventions could be offered to offenders with histories of SUDs who are serving custodial sentences. Contraband substance use takes place in controlled environments like treatment facilities (Rahman et al., 2022) and prisons (Button et al., 2023), which can have deleterious consequences for the individual, including overdose, as well as others in those settings. As such, providing access to evidence-based interventions to incarcerated individuals without a proximal release date could reduce the likelihood of substance misuse. In addition, for individuals with a SUD history who are approaching their release date, the use of electronic interventions may optimally prepare them for the post-release environment. Finally, a third potential application of electronic interventions would be as part of a structured post-release program to maximize success outside of the prison environment. Which of these applications would be most feasible and of highest priority to Canadian criminal justice settings is an open question and would require consultation and input from relevant stakeholders.

Likewise, an intervention approach would require consideration of the existing programs in consultation with stakeholders, including offenders. This would require consideration of program characteristics (theoretical basis, number and type of modules, technical requirements), existing evidence, and also associated costs. As no studies have been conducted in Canadian settings, similar uncontrolled open-label studies to assess feasibility and proof-of-concept would be a logical first step. This would, in turn, lay a foundation for either randomized controlled trials to evaluate efficacy or comparative effectiveness studies comparing two (or more) programs to evaluate whether there are superior outcomes (or equivalent outcomes in a shorter format, higher offender preference or lower cost) among multiple active intervention options.

One theme in the existing studies was that ‘dose’ of the electronic intervention was critical,

referring to the level of engagement and completion of the program. As such, future implementation protocols should consider combining an electronic treatment with contingency management to motivate maximum engagement. Contingency management refers to the provision of structured incentives to directly reinforce pro-treatment behaviors (Davis et al., 2016). These incentives often take the form of vouchers or small prizes, so they would need to be calibrated to a correctional setting but have been shown to be highly effective to promote achievement of treatment goals in the short-term (for the duration of the contingencies), which in turn provides a more optimal exposure to the collateral treatment elements (e.g., psychological treatments, pharmacological treatments). In a correctional setting, modest incentives for completing modules and demonstrating mastery on intra-intervention materials, as well as some sort of certificate of completion, could be motivating and could maximize the impact of the electronic intervention. Again, the parameters surrounding additional strategies like this would require fulsome input and support from the correctional and offender stakeholders.

In sum, the current review examined in detail the small but promising literature on electronic interventions for SUDs in correctional settings. The studies identified suggest feasibility, tolerability, and favourable impacts, albeit typically in small samples without control groups. Despite the fact that no studies were in a Canadian correctional context, these results suggest electronic interventions for SUDs in Canadian criminal justice setting are a highly promising strategy and worthy of systematic examination.

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