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Digital Substance Use Therapy: Predicting Engagement and Outcomes to Enhance Health Equity in Prisons

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Abstract

Substance use disorders (SUD) present a public health challenge and are prevalent amongst the prison population due to associations between substance use and offending. Engagement with, and outcomes from, SUD interventions vary based on sociodemographic and clinical characteristics, resulting in social inequities in therapeutic benefits. A study was recently published using a digital therapy program for SUD recovery—Breaking Free—to understand how different delivery models might influence engagement and outcomes for prison residents in the UK (practitioner-facilitated) and the US (self-directed). This study revealed baseline psychosocial differences between UK and US prison residents that may influence engagement and outcomes for this digital SUD program. Therefore, the present study reports further analyses to understand how these psychosocial differences may interact with delivery models to influence engagement and outcomes. Findings suggest men, younger prison residents, those with alcohol use issues, and those with greater levels of clinical complexity, may benefit from practitioner support to optimise engagement and outcomes. Recommendations are provided to inform delivery of this program, including identifying where resources could be allocated to enhance equity of benefits, e.g., providing practitioner support to residents, funding for practitioner training, integration with other programs, etc.

Keywords

digital therapy; health equity; prison residents; recovery; substance use disorders

1. Introduction

Different sociodemographic and clinical groups engage with healthcare interventions in different ways, meaning some may derive greater benefits than others. Research conducted with Breaking Free, a digital

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program for substance use disorder (SUD) recovery, has revealed associations between approaches to delivery, and program engagement and clinical outcomes (Elison-Davies et al., 2024). This study extends these findings by exploring how prison residents' psychosocial characteristics may interact with practitioner support to influence engagement and outcomes.

1.1. "Health Equity" and Factors That Influence Access to, and Benefits From, Digital Health Interventions

The World Health Organization (WHO) defines "health equity" as "the absence of avoidable or remediable differences among groups of people" in health outcomes (WHO, 2025). The concept recognises that different people may need different resources to achieve optimal health (Lewis et al., 2023) and is distinct from health "equality" in acknowledging that providing equal access to health resources for *everyone*—regardless of individual circumstances—does not necessarily lead to equal health outcomes. Equity aims to adjust access to resources for disadvantaged groups and remove sources of health disparities (Martin et al., 2024).

Digital technologies can increase equity of access to interventions (Kepper et al., 2024) by overcoming barriers including stigma, rurality, waiting lists, distance from services, demands on time such as work and caregiving, etc. This potential requires understanding digital health equity as arising from interactions across multiple technological, individual, organizational, and systemic factors (Kim & Backonja, 2025). Technological factors include access to digital devices, internet connectivity, and digital literacy (Borges do Nascimento et al., 2023)—these are linked to contextual health and social factors that can both be impacted by digital health inequities and impact the ability to engage with digital technologies. These include mental (Lipschitz et al., 2023) and physical health conditions (Zangger et al., 2023), cognitive capacity (Lipschitz et al., 2023), socioeconomic status (Estrela et al., 2023), and cultural attitudes towards technology (Whitehead et al., 2023). Ability to engage with digital health technologies may also be influenced by organisational and systemic factors such as poor integration of digital interventions within existing healthcare systems (Berardi et al., 2024) and insufficient health practitioner support (Borges do Nascimento et al., 2023). This framework illustrates that digital health equity is unlikely to be achieved by addressing isolated factors—instead, intervening across these multiple interconnected domains is necessary to enhance digital health equity.

1.2. Health, Social and Technological Inequities, and Injustices Experienced by People Involved in Correctional Systems

Inequities experienced by people in correctional systems demonstrate how the factors described above converge to create barriers to digital health equity in this population. They face technological inequities (Morgan et al., 2025), including lack of access to technology, which may impede development of digital skills (Fasching-Varner et al., 2014). These technological inequities can lead to prison residents struggling to adapt to technologies upon release to the community, putting them at a disadvantage in terms of job seeking, education, training, and social integration (Morgan et al., 2025).

These technological inequities are linked to the health and social disparities incarcerated people experience—impaired health and social functioning can impede the ability to engage with digital health resources, and lack of access to digital health resources can in turn negatively impact health and social

outcomes. Organisational and systemic factors within prison settings—e.g., lack of access to digital devices/internet, staff resourcing/training to support incarcerated individuals—can also exacerbate digital health inequities. Indeed, the carceral environment acts as a fundamental driver of health inequities more generally, particularly in communities of colour and among socioeconomically vulnerable populations (Kapadia, 2024). Poor living conditions in jails and prisons (Sawyer & Wagner, 2025), limited access to quality healthcare services, higher rates of chronic diseases, mental health disorders and infectious diseases, and inadequate nutrition and physical activity, can all lead to significantly poorer health outcomes in comparison to the general population (Kapadia, 2024). This, coupled with technological, health, and social barriers, means incarcerated individuals may be multiply disadvantaged with regard to digital health equity.

1.3. Predictors of Equity of Engagement and Clinical Benefits From a Digital Substance Use Program

Breaking Free is a digital program for SUD, which incorporates multiple therapeutic approaches including cognitive–behavioural therapy (Beck et al., 2011), relapse prevention (Marlatt & Donovan, 2005), mindfulness (Marlatt et al., 2010), and motivational enhancement (Miller & Rose, 2015). Table 1 describes the clinical content of Breaking Free.

Table 1. Description of the clinical content in Breaking Free.

Content in Breaking Free Online	Description of strategy
Baseline and progress check assessments	Monitor behaviour and provide feedback about progress towards goals Encourage new behaviours via positive feedback
Lifestyle balance model (LBM)	Personalised case formulation—understand links between situations, thoughts, emotions, physical sensations, behaviours, and lifestyle
Difficult situations domain of LBM	Psychoeducation on impact of problematic situations Recognise–avoid–cope Relapse prevention for situational and emotional triggers Create action plans to avoid or cope in high-risk situations Assertiveness and refusal skills training
Negative thoughts domain of LBM	Psychoeducation on impact of negative thoughts Cognitive restructuring; challenge unhelpful thoughts
Emotion impact domain of LBM	Psychoeducation on impact of emotions Attention narrowing and switching Recognise, understand, normalise, and regulate emotions
Physical sensations domain of LBM	Psychoeducation on impact of physical sensations Understanding cravings and urges Body scanning Urge surfing Relapse prevention
Unhelpful behaviours domain of LBM	Psychoeducation on impact of unhelpful behaviours Activity scheduling Behavioural activation Encourage new behaviours via purposeful activities Increase activity to increase self-esteem and avoid boredom

Table 1. (Cont.) Description of the clinical content in Breaking Free.

Content in Breaking Free Online	Description of strategy
Lifestyle domain of LBM	Psychoeducation on impact of lifestyle
	Systematic goal setting
	Implementation intentions for goal attainment
	Increase readiness to change behaviour
	Positive reinforcement

Since the development of Breaking Free in the early 2010s, understanding predictors of engagement with, and clinical outcomes from the program, has been a central focus. Findings have been obtained from the delivery of the program in UK *community settings*, including sociodemographic and clinical characteristics that may influence engagement and outcomes (e.g., Elison, Jones, et al., 2017; Elison-Davies, Hayhurst, et al., 2021; Elison-Davies, Märtens, et al., 2021; Günther et al., 2023). A "dosage effect" has also been identified—the number of behavioural change techniques (BCTs) in the program completed is positively associated with outcomes (substance use and dependence, mental health, biopsychosocial functioning, quality of life; see Elison, Jones, et al., 2017; Elison-Davies, Hayhurst, et al., 2021; Elison-Davies, Wardell, et al., 2021). Delivery model—i.e., whether the program is facilitated by practitioners or delivered as a self-directed program without practitioner support—has also been found to be associated with clinical outcomes (Günther et al., 2023).

Some studies have been completed in *correctional settings*. Criminogenic risk factors—specifically interpersonal conflict and poor mental health—have been associated with less positive outcomes, and a dose–response has also been identified in prison settings (Elison-Davies et al., 2022). The most recent corrections study indicated that different delivery models employed in UK (practitioner-facilitated) and US (self-directed with no practitioner support) prisons may influence engagement and outcomes (Elison-Davies et al., 2024). Practitioner-supported UK prison residents demonstrated greater engagement than US prison residents who were not supported, and UK prison residents experienced superior clinical outcomes. However, the number of prison residents accessing the program in the US was substantially greater due to the delivery model, i.e., the program was made available to the entire prison population, not just those engaging with prison substance misuse services (SMS) as it is in the UK.

In Elison-Davies et al. (2024), UK and US prison residents were compared at baseline. Sociodemographic differences between the groups were identified that may have interacted with the delivery model employed to influence engagement and outcomes—the UK cohort was older, whereas the US cohort was made up of a greater proportion of women and was more ethnically diverse. There were also clinical differences, with the UK cohort demonstrating greater levels of severity of alcohol/drug dependence and mental health difficulties (depression and anxiety), and lower quality of life and biopsychosocial functioning than the US cohort. Greater clinical complexity in the UK cohort was perhaps reflective of the fact that these individuals were engaging with prison SMS as they had been identified as requiring treatment for SUD. There were also criminogenic risk differences, with the US cohort reporting higher rates of interpersonal conflict, and the UK cohort reporting higher rates of unstable accommodation, work/education difficulties, health problems and risk-taking behaviours.

1.4. Aims

This study explores how psychosocial differences identified between UK and US prison residents in Elison-Davies et al. (2024) might interact with the delivery model to influence engagement with, and outcomes from, Breaking Free. Findings may provide insights into where additional resources/support might be allocated to maximise equity of benefits for prison residents.

2. Methods

2.1. Design

Quantitative study incorporating regression analyses of psychosocial characteristics, engagement and outcomes data collected from the delivery of Breaking Free in prisons in the UK (England) and the US (state of Ohio).

2.2. Participants

20,136 prison residents in England and Wales (UK: $N = 1299$) and the state of Ohio (US: $N = 18{,}837$) who engaged with the Breaking Free program between June 2017 and January 2023. UK prisons represented high security, open, remand, training, and resettlement, resulting in a broad representation of the incarcerated population. This mirrors Ohio, where the program was delivered across all 31 facilities representing every category from minimum to maximum security. Although the program is delivered across multiple US states, data from Ohio residents were included as this was the only state for which ethical approval had been granted for data to be used for research. For all residents, participation in Breaking Free was voluntary.

2.3. Procedure

In the UK delivery model, residents were referred to Breaking Free by SMS providers. The program was delivered as a manualised, group program with SMS practitioners supporting engagement (group discussion, module completion, skills practice). Sessions were either weekly two-hour sessions held over four weeks, or weekly one-hour sessions held over eight weeks, dependent on staffing, regimes, etc.

In the US delivery model, residents accessed Breaking Free via personal secure tablets that were available to all prison residents, not only those receiving substance use treatment, 24 hours a day, seven days a week. Residents accessed the program in a self-directed manner with no practitioner support and did not require referral to the program via SMS.

Upon Breaking Free account activation, all participants consented to their data being used for research, and consented to a privacy policy and end-user license agreement, before completing a baseline assessment:

1. Severity of Dependence Scale (SDS: Gossop et al., 1995): 5-item scale measuring severity of substance dependence (e.g., cravings and substance-related cognitions). Total scale score range 0–15. Internal reliability: $\alpha = .81–.90$; test–retest reliability ICC = .89.

2. Patient Health Questionnaire-4 (PHQ-4: Kroenke et al., 2009): 4-item scale that measures severity of depression and anxiety. Total scale score range is 0–12. Threshold scores on the PHQ are 0–3 (no depression/anxiety), 3–5 (mild), 6–8 (moderate), and 9–12 (severe). Internal reliability, $\alpha = .81$.
3. Five items (1, 2, 17, 18, 20) from the WHO Quality of Life measure (WHOQoL-BREF: Skevington et al., 2004). Total scale score range is 5–25. Items selected were generic enough to measure general quality of life as opposed to specific aspects of quality of life. Internal reliability of these five items was $\alpha = .84$.
4. Recovery Progression Measure (Elison et al., 2016; Elison, Dugdale, et al., 2017): 36-item scale measuring levels of impairment in six domains of biopsychosocial functioning (emotions, thoughts, behaviours, physical sensations, difficult situations, lifestyle). Within each of the six RPM domains, there are five dichotomous "yes/no" items measuring presence or absence of specific biopsychosocial difficulties (including a range of criminogenic risk factors) within that domain, and a 0–10 Likert "impact scale" assessing level of severity of impairment in that domain. Total of six Likert scale scores, range 0–60. Internal consistency, $\alpha = .89$; test–retest reliability, ICC = .73.
5. In addition to the standardised measures, the baseline assessment also contained the following:
    - Demographic items: age, gender, and ethnicity.
    - Questions about what substances each participant was experiencing difficulties with.

After baseline assessment completion, participants accessed the clinical content within Breaking Free and were required to complete fortnightly "progress check" assessments containing the psychometric measures described above. Data from progress checks allowed participants to monitor their progress whilst engaging with Breaking Free via a personalised dashboard accessed in their account. The program's backend research database automatically captured participants' baseline and progress check data, and program engagement measures (which of the 12 BCTs were completed; how many progress checks were completed).

Approval to use data from UK participants for research purposes was provided by the London South-East Research Ethics Committee on 1st March 2023. Approval was granted by the ODRC Human Subjects Research Review Committee on 3rd May 2021 to use data provided by participants in Ohio.

2.4. Data Analysis

Variables approximated a non-normal distribution (skewness < 1, kurtosis < 2, Shapiro-Wilks $< .05$). Controlling for confounding effects of baseline scores, multiple regressions were conducted to examine associations between psychosocial characteristics, delivery model, engagement measures (proportion of the 12 BCTs in the program completed and number of progress checks completed), and most recent progress check outcome measure scores. Mann-Whitney tests were used to examine associations between delivery model and engagement measures. Chi-Square tests were used in post hoc analyses exploring associations between psychosocial characteristics and engagement measures. Analyses of covariance (ANCOVA) were used in post hoc analyses exploring associations between psychosocial characteristics and outcome measure scores. Due to the number of comparisons, a more conservative significance level of $p = .01$ was adopted.

3. Results

3.1. Demographic Data Summary

Table 2 provides demographic data. The largest UK age group (35–44 years; *n* = 491, 37.9%) was older than the largest US age group (25–34 years; *n* = 7283, 38.7%). Women were more highly represented in the US group (women: *n* = 4107, 21.8%; men: *n* = 14098, 74.8%) in comparison to the UK group (women: *n* = 56, 4.3%; men: *n* = 1237, 95.5%). Three UK participants (.2%) and 261 (1.4%) US participants reported non-binary gender identities. None of the UK participants declined to disclose their gender, whereas 370 (2%) US participants did decline to disclose their gender. The UK sample was almost all White British (*n* = 1247, 96.4%), whereas the US group was more ethnically diverse, with White participants making up just over half the group (*n* = 10167, 54%), and Black African American participants making up over a quarter (*n* = 5217, 27.6%). Alcohol was the most prevalent primary problem substance in both the UK (*n* = 902, 45.4%) and US groups (*n* = 16938, 56.1%).

Table 2. Demographic data for UK and US prison residents engaging with Breaking Free.

		UK		US	
		n	%	*n*	%
Age group*	18–24 years	121	9.4	2224	11.8
	25–34 years	422	32.6	7283	38.7
	35–44 years	491	37.9	5605	29.8
	45–54 years	217	16.8	2414	12.8
	55–64 years	41	3.2	739	3.9
	>65 years	2	.1	200	1
	Did not disclose	0	0	372	2
Gender†	Women	56	4.3	4107	21.8
	Men	1237	95.5	14,098	74.8
	Non-binary gender identity	3	.2	261	1.4
	Declined to disclose	0	0	370	2
Ethnicity§	American/Alaskan Native	0	0	236	1.3
	Asian	11	.9	79	.4
	Black	12	.9	5217	27.6
	Hispanic/Latino	0	0	639	3.4
	Mixed ethnicity	22	1.6	1687	9
	Native Hawaiian/Pacific Islander	0	0	52	.3
	White	1247	96.4	10,167	54
	Other ethnicity	2	.2	0	0
	Did not disclose	0	0	760	4
Program pathway◊	Alcohol	186	14.3	2560	13.6
	Drugs	635	48.9	7172	38.1
	Alcohol and drugs	478	36.8	9105	48.3

Notes: * UK *N* = 1294, US *N* = 18,837, all *N* = 20,131; † UK *N* = 1296, US *N* = 18,837, all *N* = 20,133; § UK *N* = 1294, US *N* = 18,837, all *N* = 20,131; ◊ UK *N* = 1299, US *N* = 18,837, all *N* = 20,136.

The second most prevalent primary problem substance in the UK group was heroin ($n = 374$, 18.8%), compared to methamphetamine in the US group ($n = 2606$, 8.6%). The third most prevalent primary problem substance in the US group was crack ($n = 285$, 14.4%), compared to marijuana in the US group ($n = 2472$, 8.2%).

3.2. Associations Between Psychosocial Characteristics and Delivery Model, With Program Engagement

Multiple regressions were run to explore associations between psychosocial characteristics and delivery model, with program engagement measures (see Table 3).

Regression models significantly predicted engagement with Breaking Free, including BCT completions ($F(16,5852) = 124.463$, $p < .001$, $R^2 = .252$), and progress check completions ($F(16,5852) = 113.639$, $p < .001$, $R^2 = .235$).

When associations between individual psychosocial characteristics, delivery model, and program engagement measures were examined, proportion of BCTs completed was significantly associated with delivery model ($t = -9.111$, $p < .001$), gender ($t = -5.956$, $p < .001$), ethnicity ($t = 4.987$, $p < .001$), primary problem substance ($t = 2.643$, $p = .008$) and number of progress checks completed ($t = 41.596$, $p < .001$). Standardised beta coefficients indicated small effect sizes for these statistically significant findings (<.30).

Post hoc analyses revealed that UK participants completed significantly more BCTs than US participants (UK *mean* 3.168, *SD* 4.179; US *mean* 1.461, *SD* 3.369; $p < .001$). Post hoc analyses were conducted to explore the significant associations between psychosocial variables and program engagement, to understand whether they were associated with engagement outside of the influence of country-specific delivery model.

Significant differences in the proportion of BCTs completed were identified between gender groups ($X^2 = 312.977$, $p < .001$). Women completed a significantly higher proportion of the BCTs than the other gender groups—see Figure 1 (women: *mean* 2.03, *SD* 5.137; men: *mean* 1.81, *SD* 8.369; non-binary: *mean* 1.52, *SD* 4.411, declined to disclose gender: *mean* .96, *SD* 2.615).

Table 3. Associations between psychosocial characteristics and delivery model, with program engagement.

Program engagement measure	Independent variables UK and US prison resident psychosocial differences identified in 2024 study	*β*	*t*	Sig	95% confidence interval		Overall regression model			
					lower	upper	R^2	*F*	*df*	*p*
Proportion of 12 BCTs completed	Delivery model	−.113	−9.111	< .001	−2.469	−1.594				
	Age group	−.041	−3.471	< .001	−.228	−.063				
	Gender	−.069	−5.956	< .001	−.508	−.256				
	Ethnicity	.061	4.987	< .001	.049	.113				
	Primary problem substance	.031	2.643	.008	.011	.076				
	Baseline SDS Alcohol	.001	.068	.946	−.026	.028				
	Baseline SDS Drugs	−.025	−1.858	.063	−.045	.001				
	Baseline PHQ-4	.008	.498	.619	−.027	.046	.252	124.463	16, 5852	< .001
	Baseline WHOQoL-BREF	.017	1.174	.241	−.014	.056				
	Baseline RPM	.016	.976	.329	−.005	.015				
	Interpersonal conflict	−.006	−.445	.656	−.260	.164				
	Unstable accommodation	.032	2.447	.014	.054	.493				
	Work/education difficulties	−.010	−.772	.440	−.319	.139				
	Health problems	−.007	−.564	.573	−.296	.164				
	Risk-taking behaviours	−.013	−1.019	.308	−.343	.108				
	Progress checks completed	.472	41.596	< .001	.301	.330				

Table 3. (Cont.) Associations between psychosocial characteristics and delivery model, with program engagement.

Program engagement measure	Independent variables UK and US prison resident psychosocial differences identified in 2024 study	*β*	*t*	Sig	95% confidence interval		Overall regression model			
					lower	upper	R^2	*F*	*df*	*p*
Number of progress checks completed	Delivery model	.051	4.059	< .001	.712	2.043				
	Age group	.085	7.141	< .001	.328	.577				
	Gender	.032	2.706	.007	.073	.454				
	Ethnicity	.007	.586	.558	−.034	.063				
	Primary problem substance	−.023	−1.973	.049	−.099	.000				
	Baseline SDS Alcohol	−.005	−.380	.704	−.049	.033				
	Baseline SDS Drugs	.007	.497	.619	−.026	.044				
	Baseline PHQ-4	−.024	−1.442	.149	−.097	.015	.235	113.639	16, 5852	< .001
	Baseline WHOQoL-BREF	.016	1.129	.259	−.022	.083				
	Baseline RPM	.010	.573	.567	−.011	.020				
	Interpersonal conflict	.012	.946	.344	−.166	.476				
	Unstable accommodation	−.006	−.430	.667	−.405	.259				
	Work/education difficulties	.007	.519	.604	−.255	.439				
	Health problems	.027	2.031	.042	.013	.707				
	Risk-taking behaviours	.003	.207	.836	−.305	.377				
	Proportion of BCTs completed	.010	.573	.567	−.011	.020				

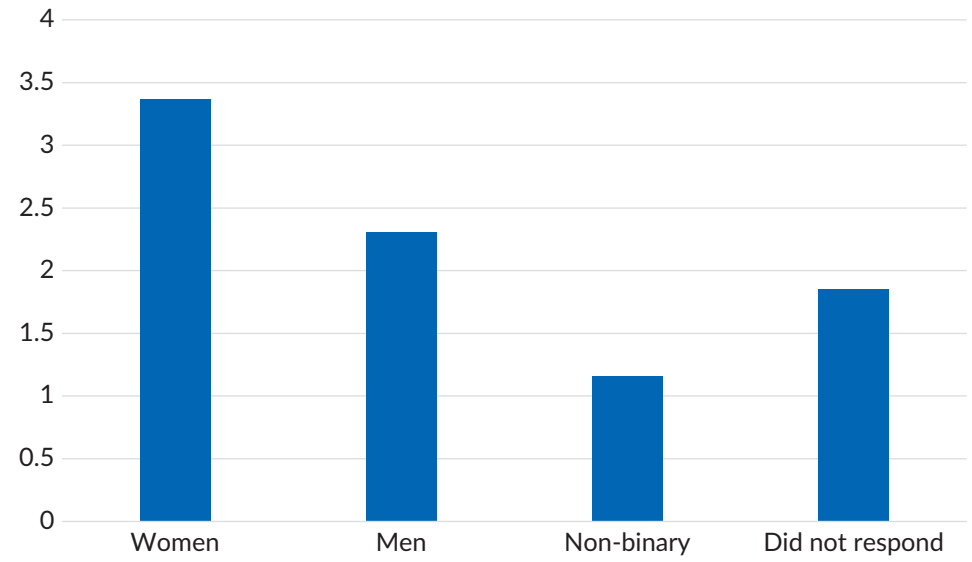


Figure 1. Proportion of BCTs completed by gender group.

Significant differences in proportion of BCTs completed were identified between ethnicity groups (X^2 = 1464.163, p < .001). Asian British participants completed the highest proportion of BCTs (*mean* 7.55, *SD* 5.50), with White British participants completing the second highest proportion of BCTs (*mean* 4.82, *SD* 4.30). The lowest proportions of BCT completions were from Black American participants (*mean* 1.65, *SD* 3.38) and those participants who did not disclose their ethnicity (*mean* 1.68, *SD* 3.55)—see Figure 2.

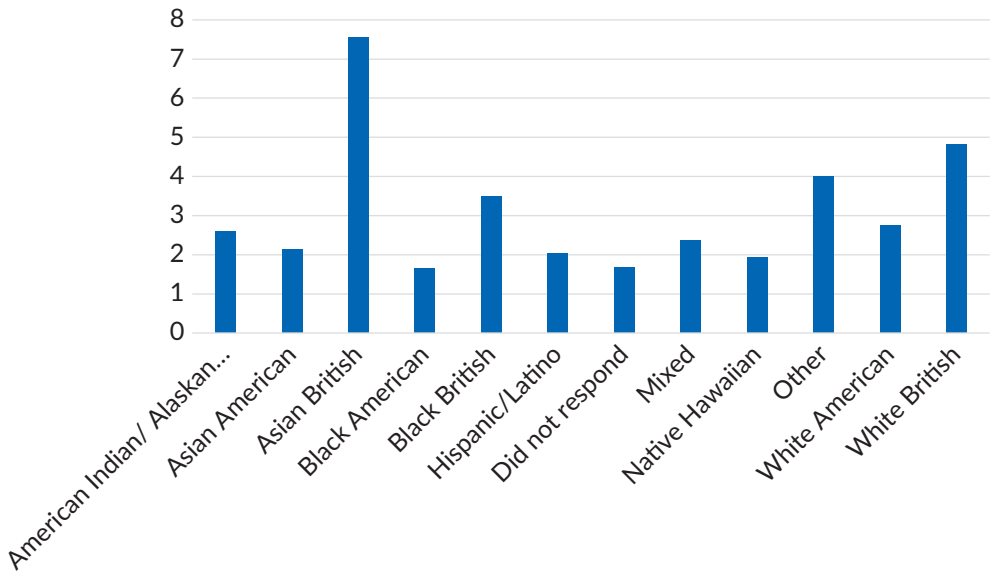


Figure 2. Proportion of BCTs completed by ethnicity.

There were also significant differences in the proportion of BCTs completed amongst primary problem substance groups (X^2 = 128.487, p < .001), with participants reporting alcohol as their primary problem substance completing the lowest proportion of BCTs (*mean* .37, *SD* 1.78) and participants reporting anticonvulsants (i.e., pregabalin, gabapentin) as their primary problem substance completing the highest proportion of BCTs (*mean* 4.72, *SD* 5.07)—see Figure 3.

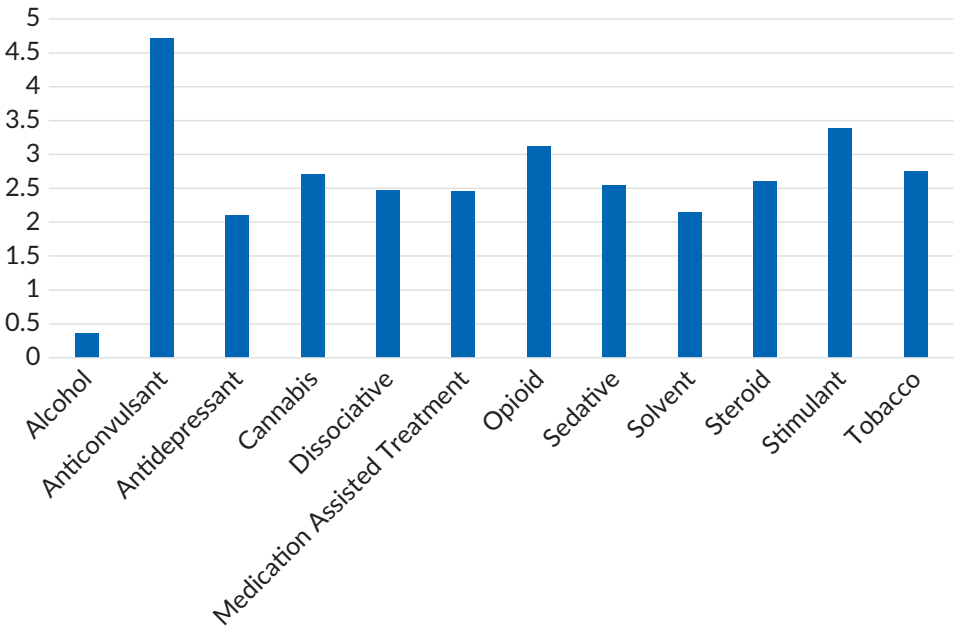


Figure 3. Proportion of BCTs completed by primary problem substance group.

The number of progress check assessments completed was significantly associated with delivery model ($t = 4.059$, $p < .001$), age group ($t = 7.141$, $p < .001$), and gender ($t = 2.706$, $p = .007$). Post hoc analyses revealed that UK participants completed significantly more progress check assessments than US participants (UK *mean* 1.99, *SD* 5.519; US *mean* 1.10, *SD* 6.192; $p < .001$). Significant differences in the number of progress checks completed were also identified between age groups ($X^2 = 1101.351$, $p < .001$). Number of progress check completions increased with age, with the 55–64 years age group completing the highest number—see Figure 4 (18–24 years: *mean* 1.03, *SD* 3.200; 25–43 years: *mean* 1.37, *SD* 4.193; 35–44 years: *mean* 2.07, *SD* 5.299; 45–54 years: *mean* 3.02, *SD* 17.114; 55–64 years: *mean* 3.15, *SD* 8.599; 65+ years: *mean* 2.76, *SD* 9.964; declined to disclose age: *mean* 1.22, *SD* 4.091).

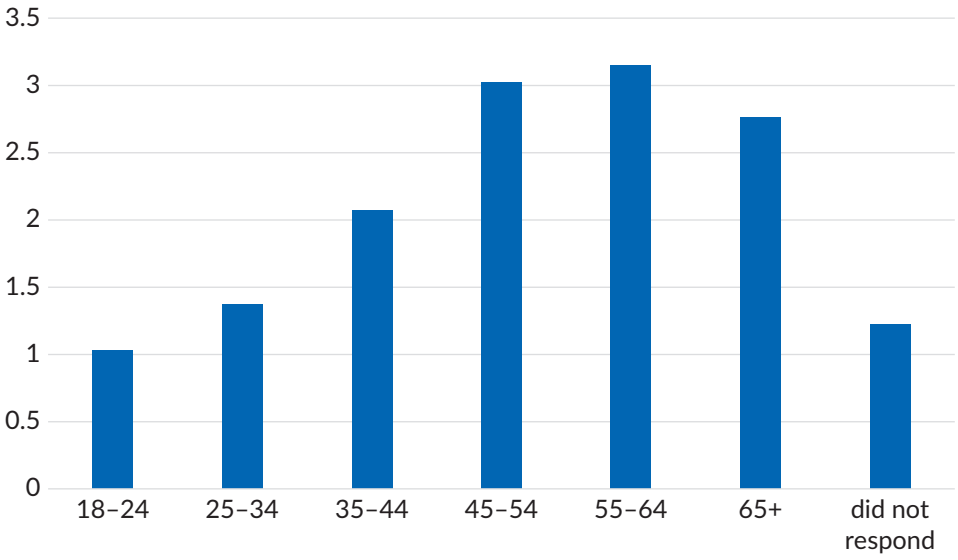


Figure 4. Number of progress checks completed by age group.

Psychosocial characteristics and delivery model were significantly associated with BCT and progress check completions. Beta coefficients (β) were ranked to understand which psychosocial differences were most significantly associated with program engagement measures (see Table 4). Beta coefficients for group differences in program engagement are also reported (proportion of BCTs completed, number of progress checks completed). Age and gender were both significantly associated with the two engagement measures.

Table 4. Ranked beta coefficients demonstrating strongest to weakest associations between psychosocial characteristics and delivery model, with program engagement.

Independent variables: UK and US prison resident psychosocial differences identified in 2024 study	Engagement measure	Ranked β
Progress check completions	BCT completions	0.472
Delivery model	BCT completions	−0.113
Age group	Progress check completions	0.085
Gender	BCT completions	−0.069
Ethnicity	BCT completions	0.061
Delivery model	Progress check completions	0.051
Age group	BCT completions	−0.041
Gender	Progress check completions	0.032
Primary problem substance	BCT completions	0.031

3.3. Associations Between Psychosocial Characteristics, Program Engagement Measures and Delivery Model, With Progress Check Scores

Multiple regressions were run for each progress check outcome measure to explore associations between psychosocial characteristics, program engagement measures and delivery model, with progress check scores, whilst controlling for baseline scores on each outcome measure (see Table 5).

Regression models significantly predicted scores at progress check on each of the five outcome measures: alcohol dependence (SDS–Alcohol: $F(17,2883) = 35.419$, $p < .001$, $R^2 = .168$), drug dependence (SDS–Drugs: $F(17,2886) = 34.367$, $p < .001$, $R^2 = .163$), depression/anxiety (PHQ-4: $F(17,2889) = 50.057$, $p < .001$, $R^2 = .223$), quality of life (WHOQoL-BREF: $F(17,2885) = 58.038$, $p < .001$, $R^2 = .250$) and biopsychosocial functioning (RPM: $F(17,2885) = 51.750$, $p < .001$, $R^2 = .229$).

When associations between individual psychosocial characteristics and program engagement measures with progress check scores were examined, several relationships were identified. The proportion of the 12 BCTs completed was associated with progress check scores: alcohol dependence (SDS–Alcohol: $t = -4.711$, $p < .001$), drug dependence (SDS–Drugs: $t = -6.025$, $p < .001$), depression/anxiety (PHQ-4: $t = -10.942$, $p < .001$), quality of life (WHOQoL-BREF: $t = 12.386$, $p < .001$) and biopsychological functioning ($t = -15.603$, $p < .001$). Number of progress checks completed was also associated with progress check scores: drug dependence (SDS–Drugs: $t = -3.607$, $p < .001$), depression/anxiety (PHQ-4: $t = -3.417$, $p < .001$), quality of life (WHOQoL-BREF: $t = 4.858$, $p < .001$) and biopsychological functioning ($t = -4.521$, $p < .001$). Higher numbers of progress check completions were associated with less severe drug dependence, depression/anxiety, and better quality of life and biopsychosocial functioning. Standardised beta coefficients indicated small effect sizes for these statistically significant findings (< .30).

Table 5. Associations between psychosocial characteristics, program engagement measures and delivery model, with progress check scores.

Outcome measure	Independent variables: UK and US prison resident psychosocial differences identified in 2024 study	*β*	*t*	Sig	95% confidence interval		Overall regression model			
					lower	upper	R^2	*F*	*df*	*p*
SDS—Alcohol	Delivery model	−.024	−1.249	.212	−.959	.213				
	Age group	.026	1.446	.148	−.032	.215				
	Gender	.008	.437	.662	−.143	.225				
	Ethnicity	−.043	−2.398	.017	−.061	−.006				
	Primary problem substance	.014	.770	.441	−.029	.067				
	Baseline SDS Alcohol	.349	17.245	< .001	.318	.400				
	Baseline SDS Drugs	.051	2.504	.012	.010	.079				
	Baseline PHQ-4	.051	2.147	.032	.005	.112				
	Baseline WHOQoL-BREF	.002	.110	.913	−.049	.055	.168	35.419	17,2883	< .001
	Baseline RPM	−.017	−.670	.503	−.020	.010				
	Interpersonal conflict	.045	2.371	.018	.066	.698				
	Unstable accommodation	.006	.311	.756	−.273	.375				
	Work/education difficulties	.011	.566	.572	−.235	.426				
	Health problems	−.005	−.242	.809	−.379	.296				
	Risk-taking behaviours	−.017	−.873	.383	−.484	.186				
	Proportion of BCTs completed	−.088	−4.711	< .001	−.110	−.045				
	Progress checks completed	−.031	−1.665	.096	−.033	.003				

Table 5. (Cont.) Associations between psychosocial characteristics, program engagement measures and delivery model, with progress check scores.

Outcome measure	Independent variables: UK and US prison resident psychosocial differences identified in 2024 study	*β*	*t*	Sig	95% confidence interval		Overall regression model			
					lower	upper	R^2	*F*	*df*	*p*
SDS—Drugs	Delivery model	.010	.527	.598	−.494	.857				
	Age group	.005	.260	.795	−.124	.162				
	Gender	−.010	−.590	.555	−.278	.149				
	Ethnicity	−.013	−.703	.482	−.043	.020				
	Primary problem substance	.034	1.897	.058	−.002	.110				
	Baseline SDS Alcohol	.027	1.351	.177	−.015	.080				
	Baseline SDS Drugs	.325	15.966	< .001	.289	.369				
	Baseline PHQ-4	.058	2.437	.015	.015	.140				
	Baseline WHOQoL-BREF	−.026	−1.224	.221	−.097	.023	.163	34.367	17,2886	< .001
	Baseline RPM	−.003	−.131	.896	−.019	.016				
	Interpersonal conflict	.019	.992	.321	−.181	.552				
	Unstable accommodation	.014	.707	.479	−.240	.511				
	Work/education difficulties	−.020	−1.071	.284	−.592	.174				
	Health problems	−.002	−.084	.933	−.408	.375				
	Risk-taking behaviours	.009	.467	.640	−.296	.482				
	Proportion of BCTs completed	−.113	−6.025	< .001	−.153	−.078				
	Progress checks completed	−.067	−3.607	< .001	−.059	−.017				

Table 5. (Cont.) Associations between psychosocial characteristics, program engagement measures and delivery model, with progress check scores.

Outcome measure	Independent variables: UK and US prison resident psychosocial differences identified in 2024 study	*β*	*t*	Sig	95% confidence interval		Overall regression model			
					lower	upper	R^2	*F*	*df*	*p*
PHQ-4	Delivery model	.065	3.567	< .001	.441	1.518				
	Age group	−.031	−1.793	.073	−.219	.010				
	Gender	.063	3.729	< .001	.153	.493				
	Ethnicity	.050	2.847	.004	.011	.062				
	Primary problem drug	.014	.832	.406	−.026	.063				
	Baseline SDS Alcohol	.020	1.018	.309	−.018	.057				
	Baseline SDS Drugs	.033	1.699	.089	−.004	.060				
	Baseline PHQ-4	.287	12.491	< .001	.266	.365				
	Baseline WHOQoL-BREF	−.055	−2.668	.008	−.113	−.017	.223	50.057	17,2889	< .001
	Baseline RPM	.049	2.037	.042	.001	.028				
	Interpersonal conflict	.026	1.423	.155	−.080	.503				
	Unstable accommodation	−.002	−.107	.915	−.316	.283				
	Work/education difficulties	.020	1.092	.275	−.135	.475				
	Health problems	−.004	−.185	.853	−.341	.282				
	Risk-taking behaviours	.031	1.628	.104	−.053	.567				
	Proportion of BCTs completed	−.198	−10.942	< .001	−.197	−.137				
	Progress checks completed	−.061	−3.417	< .001	−.045	−.012				

Table 5. (Cont.) Associations between psychosocial characteristics, program engagement measures and delivery model, with progress check scores.

Outcome measure	Independent variables: UK and US prison resident psychosocial differences identified in 2024 study	*β*	*t*	Sig	95% confidence interval		Overall regression model			
					lower	upper	R^2	*F*	*df*	*p*
WHOQoL-BREF	Delivery model	−.061	−3.419	< .001	−1.547	−.419				
	Age group	−.024	−1.398	.162	−.204	.034				
	Gender	−.078	−4.688	< .001	−.600	−.246				
	Ethnicity	−.057	−3.344	< .001	−.071	−.019				
	Primary problem drug	.001	.070	.944	−.045	.048				
	Baseline SDS Alcohol	.006	.327	.743	−.033	.046				
	Baseline SDS Drugs	.029	1.499	.134	−.008	.059				
	Baseline PHQ-4	−.086	−3.789	< .001	−.151	−.048				
	Baseline WHOQoL-BREF	.282	13.855	< .001	.302	.401	.250	58.038	17,2885	< .001
	Baseline RPM	−.032	−1.340	.180	−.024	.005				
	Interpersonal conflict	−.037	−2.051	.040	−.622	−.014				
	Unstable accommodation	−.028	−1.544	.123	−.557	.066				
	Work/education difficulties	−.038	−2.117	.034	−.662	−.025				
	Health problems	−.028	−1.470	.142	−.569	.081				
	Risk-taking behaviours	−.020	−1.068	.285	−.498	.147				
	Proportion of BCTs completed	.220	12.386	< .001	.166	.228				
	Progress checks completed	.085	4.858	< .001	.025	.060				

Table 5. (Cont.) Associations between psychosocial characteristics, program engagement measures and delivery model, with progress check scores.

Outcome measure	Independent variables: UK and US prison resident psychosocial differences identified in 2024 study	β	t	Sig	95% confidence interval		Overall regression model			
					lower	upper	R^2	F	df	p
RPM	Delivery model	.045	2.454	.014	.597	5.348				
	Age group	.019	1.077	.281	−.226	.777				
	Gender	.059	3.463	< .001	.571	2.061				
	Ethnicity	.000	.009	.993	−.110	.111				
	Primary problem drug	−.009	−.507	.613	−.245	.145				
	Baseline SDS Alcohol	.034	1.765	.078	−.017	.314				
	Baseline SDS Drugs	.004	.227	.820	−.125	.158				
	Baseline PHQ-4	.051	2.241	.025	.031	.466				
	Baseline WHOQoL-BREF	−.043	−2.089	.037	−.433	−.014	.229	51.750	17,2885	< .001
	Baseline RPM	.235	9.816	< .001	.243	.365				
	Interpersonal conflict	.028	1.516	.130	−.290	2.270				
	Unstable accommodation	−.010	−.521	.602	−1.663	.965				
	Work/education difficulties	.022	1.227	.220	−.501	2.179				
	Health problems	−.013	−.676	.499	−1.842	.898				
	Risk-taking behaviours	.046	2.405	.016	.308	3.026				
	Proportion of BCTs completed	−.281	−15.603	< .001	−1.176	−.914				
	Progress checks completed	−.081	−4.521	< .001	−.240	−.095				

Other individual independent variables included in the multiple regressions were associated with progress check scores. Delivery model (UK: practitioner-facilitated, US: self-directed) was associated with depression/anxiety (PHQ-4: $t = 3.567$, $p < .001$) and quality of life (WHOQoL-BREF: $t = -3.419$, $p < .001$). Ethnicity was also associated with depression/anxiety (PHQ-4: $t = 2.847$, $p = .004$) and quality of life (WHOQoL-BREF: $t = -3.344$, $p < .001$). Gender was associated with depression/anxiety (PHQ-4: $t = 3.729$, $p = .004$) and biopsychosocial functioning (RPM: $t = 3.463$, $p < .001$). Baseline depression/anxiety was associated with quality of life (PHQ-4: $t = -3.789$, $p < .001$), and baseline quality of life was associated with depression/anxiety (PHQ-4: $t = -2.668$, $p = .008$). Standardised beta coefficients indicated small effect sizes for these statistically significant findings (< .30).

Post hoc analyses revealed that gender was significantly associated with depression/anxiety ($F(3, 8207) = 34.204$, $p < .001$) and biopsychosocial functioning ($F(3, 8186) = 42.216$, $p < .001$), with estimated marginal means (*EMM*) demonstrating women had less severe depression/anxiety (women *EMM* = 3.707; men = *EMM* 4.643; non-binary = *EMM* 5.015; did not disclose gender = *EMM* 4.961) and better biopsychosocial functioning (women *EMM* = 22.358; men *EMM* = 27.225; non-binary *EMM* = 28.101; did not disclose gender *EMM* = 27.195) at most recent progress check compared to other gender groups.

Table 6. Ranked beta coefficients demonstrating strongest to weakest associations between psychosocial characteristics and progress check measures.

Independent variables: UK and US prison resident psychosocial differences identified in 2024 study	Progress check outcome measures	Ranked *β*
BCTs	RPM	−0.281
BCTs	WHOQoL-BREF	0.22
BCTs	PHQ-4	−0.198
BCTs	SDS Drug	−0.113
BCTs	SDS Alc	−0.088
PHQ-4	WHOQoL-BREF	−0.086
Progress checks	WHOQoL-BREF	0.085
Progress checks	RPM	−0.081
Gender	WHOQoL-BREF	−0.078
Progress checks	SDS Drug	−0.067
Delivery model	PHQ-4	0.065
Gender	PHQ-4	0.063
Progress checks	PHQ-4	−0.061
Delivery model	WHOQoL-BREF	−0.061
Gender	RPM	0.059
Ethnicity	WHOQoL-BREF	−0.057
WHOQoL-BREF	PHQ-4	−0.055
Ethnicity	PHQ-4	0.05

4. Discussion

This study builds on findings from a recently published study (Elison-Davies et al., 2024) exploring engagement and outcomes for prison residents in the UK and US who used a digital program for SUD recovery—Breaking Free. This 2024 study identified baseline psychosocial differences between UK and US prison residents, and differences between these groups in engagement with the program and clinical outcomes, which could partially be accounted for by the different delivery models employed (UK: practitioner-facilitated; US: self-directed with no practitioner support). These two delivery models exemplify the difference between "equality"—where in the US, access to the program is provided to all prison residents, and "equity"—where in the UK, prison residents with identified, clinically relevant SUD can access the additional support they need when engaging with this digital SUD program.

This new study extends Elison-Davies et al.'s (2024) study by exploring the extent to which psychosocial characteristics may interact with the delivery model to influence equity of engagement and outcomes for prison residents using Breaking Free. Findings may provide insights into how resources should be allocated when delivering this digital SUD program to optimise engagement, outcomes and equity of clinical benefits.

4.1. Summary of Findings

Factors associated with greater engagement with Breaking Free—proportion of BCTs and number of progress checks completed—were the UK practitioner-facilitated delivery model, being a woman, being of middle and older age, and being of Asian British ethnicity. Being a woman was also associated with greater improvements in mental health and biopsychosocial functioning, which may be associated with the fact that women exhibited the greatest levels of engagement with the program. There were also differences in levels of engagement based on primary problem substance, with participants reporting alcohol as their primary problem substance exhibiting lowest levels of engagement, and those reporting anticonvulsants (i.e., pregabalin, gabapentin) as their primary problem substance exhibiting highest levels of engagement.

When examining how engagement with this digital SUD program might be associated with outcomes on progress check measures, greater engagement with the program was associated with greater improvements on all outcome measures (substance dependence, mental health, quality of life, biopsychosocial functioning). Delivery model appeared to be associated with outcomes—i.e., the UK model was associated with better depression/anxiety and quality of life outcomes. However, only tentative conclusions around the impact of delivery model on outcomes can be made as delivery models cannot be separated from unmeasured contextual/structural influences from the different correctional systems in the UK and US (e.g., referral processes, cultures, available treatment services, etc.). Gender was also associated with depression/anxiety outcomes, with women experiencing the best outcomes, perhaps because women exhibited the highest levels of engagement with Breaking Free. Although the statistically significant findings described above were obtained, they should be interpreted cautiously as standardised beta coefficients were less than .30, indicating small effect sizes. However, the literature demonstrates that standardised beta coefficients should also be interpreted with caution, especially when analyses include multiple predictor variables that may demonstrate multicollinearity (Yeatts et al., 2017).

4.2. Relation of Findings to the Published Literature

Findings concur with published Breaking Free studies reporting that implementation with practitioner support is associated with higher levels of engagement and better clinical outcomes compared to self-directed engagement (Elison-Davies et al., 2024; Günther et al., 2023). Studies of other digital interventions similarly demonstrate better engagement and outcomes when people are supported to work through these programs by practitioners, rather than in a self–directed manner (e.g., Borghouts et al., 2021; Lipschitz et al., 2023).

The SUD literature also demonstrates that women engage with treatment more consistently than men (Urbanoski et al., 2018), even when women may present to services with greater clinical complexity (Polak et al., 2015). The literature also shows how age may be associated with engagement and outcomes from digital SUD (Kline-Simon et al., 2019) and mental health interventions (Boucher & Raiker, 2024)—adults between the ages of 30—50 exhibit greater levels of engagement than younger and older groups. The literature around associations between ethnicity and initiation of SUD treatment is mixed, although studies demonstrate that when people do engage, ethnicity does not appear to be significantly related to engagement (Acevedo et al., 2012). However, more research needs to be conducted to better understand how treatment can be more accessible and culturally sensitive for different ethnic groups (Johnson et al., 2025).

The present study also demonstrated variation in engagement based on primary problem substance. The literature demonstrates that the kinds of substances people use can be associated with how they might engage with SUD treatment (López et al., 2021). Though again, more research needs to be conducted to fully understand this association for users of Breaking Free.

4.3. Implications of Findings for Practice

Findings extend those from the Elison-Davies et al.'s (2024) study by further exploring how psychosocial factors may interact with the delivery model employed. Findings indicate where resources may be targeted to support specific groups to engage effectively—at least in prison settings—to enhance engagement and maximise equity of clinical benefits. In this study, being of younger age, being a man, and using Breaking Free for alcohol use may reduce engagement and clinical benefits—such individuals therefore may need additional support to engage with the program.

Although not directly explored in this study, prison contextual/structural dynamics outside of practitioner support may also have influenced engagement, i.e., challenges moving prison residents to group IT rooms, regime changes such as prison recategorization, resource limitations including understaffing, etc. In US prisons where the program is delivered via in–cell technologies, some of these additional barriers may have been alleviated. There may also have been differences in voluntariness to participate, as UK residents were a treatment–seeking population whereas in the US they were the general prison population, which complicates comparisons of the two groups. There may also be complexities around the degree to which participation is truly "voluntary" in prison settings due to implicit pressure/coercion and perceived benefits and privileges around participation (e.g., in supporting favourable reviews, etc.).

Despite potential confounding factors, findings suggest that deploying a hybrid of the US and UK delivery models might be beneficial. A US self-directed model facilitates a population-wide approach that can broaden access for residents who may not otherwise access SMS treatment. Barriers to treatment might include perceptions that SMS are only appropriate for some kinds of substances (are "opioid-centric"), staff caseload capacity, waiting lists, and concerns of reprisal for admitting substance use. Conversely, a UK model that is practitioner-supported can offer targeted support for residents identified as requiring a more structured, intensive approach to intervention delivery (i.e., greater clinical complexity, alcohol users, younger prison residents, men, etc.).

Qualitative research has examined additional potential benefits of Breaking Free. Prison residents and staff reported that engaging with the program supported development of prison residents' digital skills (Davies et al., 2017; Pittard et al., 2023). Future research could explore how delivery of the program might reduce social barriers post-release that may be related to lack of digital literacy (i.e., financial support, access to education/training and employment opportunities, etc.). Additionally, exploration of how Breaking Free might be best delivered as a complementary program alongside other prison behavioural programs should also be a priority (Morris & Graham, 2019).

4.4. Study Limitations

There were numerous limitations including engagement with Breaking Free being voluntary, so data reported came from prison residents who were self-selecting. Therefore, only tentative claims about the clinical impact of the program—and delivery models—can be made due to potential treatment selection bias and the influence of unmeasured factors, including participant motivation and treatment readiness. Unmeasured influences from the different correctional systems (e.g., referral processes, cultures, available treatment services, etc.) also mean only tentative conclusions can be drawn. Other limitations that reduce certainty around the impact of the program and delivery models include that this was an observational non-randomised study—large amounts of data were also missing due to incomplete progress check assessments. Additionally, as beta coefficients demonstrated effects sizes to be small, the clinical significance of findings could be questioned.

5. Conclusions

This study identified several participant psychosocial characteristics that could influence equity of engagement with, and clinical benefits from, a digital program for SUD—Breaking Free—when delivered in secure correctional settings. Communicating these characteristics to organisations implementing digital programs may support decisions around which individuals might benefit from additional support when engaging with such programs. This is important given the health, social and technological injustices faced by people involved in correctional systems.

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Conflict of Interests

All authors are employed by TELUS Health (UK), where the Breaking Free program is developed.

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