Methadone-Assisted Opiate Withdrawal and Subsequent Heroin Abstinence: The Importance of Psychological Preparedness

Steve Jones, PhD (ORCID),[1] **Barbara Jack, PhD,**[2] **Julie Kirby, PhD,**[3] **Thomas L. Wilson, PhD** (ORCID),[4] **Philip N. Murphy, PhD** (ORCID)[5]

[1]Department of Psychology, Faculty of Health, Social Care, and Medicine, Edge Hill University, Ormskirk, UK
[2]Evidence-Based Practice Research Centre, Faculty of Health, Social Care, and Medicine, Edge Hill University, Ormskirk, UK
[3]Faculty of Health, Social Care, and Medicine, Edge Hill University, Ormskirk, UK
[4]School of Applied Social Sciences, De Montford University, Leicester, UK
[5]Department of Psychology, Edge Hill University, Ormskirk, UK

Background and Objectives: Treatment guidelines emphasize patients' readiness for transitioning from opiate substitution treatment (OST) to opiate withdrawal and abstinence. Psychological preparedness indicators for this transition were examined.
Methods: Patients (all male) were recruited from three treatment settings: prison, an inpatient detoxification unit, and an outpatient clinic. Time 1 (T1) was admission to methadone-assisted withdrawal in all settings. Time 2 (T2) was a 6-month follow-up. With $n = 24$ at T1 for each group ($N = 72$), a battery of instruments relevant to psychological preparedness was administered.
Results: At T1, inpatients had higher self-efficacy beliefs for successful treatment completion than prison patients. For patients contactable at T2, T1 self-efficacy positively predicted T2 opiate abstinence. No other variable improved prediction. T1 SOCRATES (Stages of Change Readiness and Treatment Eagerness Scale) ambivalence scores, age, and lifetime heroin use duration predicted maintenance of contact or not with treatment services and contactability by the researcher. Measures of mood did not differ between groups at T1 or predict T2 outcomes.
Discussion and Conclusions: Self-efficacy beliefs are a potentially useful indicator of readiness for transitioning from OST to a medically assisted opiate withdrawal and subsequent abstinence. Ambivalence regarding change, age, and lifetime heroin use duration are potentially useful predictors of patients maintaining contact with services, and of being retained in research.
Scientific Significance: These findings advance existing literature and knowledge by highlighting the importance of self-efficacy in psychological preparedness for opiate abstinence, and the predictive utility to clinicians of this and other variables measurable at admission, in the clinical management of opiate users. (© 2020 The Authors. *The American Journal on Addictions* published by Wiley Periodicals LLC on behalf of The American Academy of Addiction Psychiatry (AAAP);00:00–00)

INTRODUCTION

Interventions targeting opiate abstinence pose challenges to patients arising from withdrawal symptoms,[1] followed by longer-term challenges around establishing an opiate-free life. The latter may include craving to use opiates again,[2] pressure to relapse from opiate misusing acquaintances,[3] and the need to replace opiate misuse as a coping mechanism for problems in living.[4] Opiate abstinence treatments occur in a variety of settings including hospital wards, outpatient clinics, and prisons. These may differ regarding the extent of psychosocial support available, with potential consequences for patients' affective states and commitment to treatment objectives. UK treatment guidelines emphasize the importance of patients' preparedness for opiate withdrawal, and their active engagement in treatment decisions, particularly regarding the discontinuation of opiate substitution treatment (OST) in favor of a withdrawal regime.[5,6] However, pressure from governmental sources encourages abstinence-orientated treatments wherever possible. Concerns have consequently arisen regarding adverse outcomes due to patients being channeled toward abstinence without sufficient preparation and commitment to this step, particularly where the withdrawal stage will occur in prison.[7] In other governmental jurisdictions,

including the United States, OST is not generally available in prisons despite evidence of its effectiveness. Opiate withdrawal is, therefore, enforced regardless of patient preparedness, with a consequent decreased likelihood of future treatment engagement and an increased likelihood of further dangerous opiate misuse.[8,9]

Self-efficacy is an element of psychological preparedness for addiction treatment, which has been examined in relation to a variety of substances across treatment contexts.[10-12] Self-efficacy is generally understood to refer to a person's belief in their ability to achieve specific goals.[13] For addiction treatment, this implies attaining treatment objectives including, where appropriate, abstinence from a drug of addiction. Where OST has taken the form of methadone maintenance there is evidence that self-efficacy is positively related to achieving treatment goals such as enhanced life stability and avoiding illegal drugs.[14-17]

For abstinence-orientated treatment, there are few studies examining the predictive value of self-efficacy at treatment admission for subsequent outcomes. Psychometric measures of admission self-efficacy for outpatient methadone withdrawal have been shown to remain stable during the stabilization stage of medication, but to diminish progressively with tapering methadone doses.[18] Illicit opiate use in this sample increased during the methadone taper. Another study reported that higher admission self-efficacy for a brief inpatient methadone detoxification predicted a greater likelihood of refusing post-detoxification medication to maintain abstinence.[19] However, the success rate for maintaining abstinence was not reported, and this study measured self-efficacy using an ad hoc scale comprising one question. Confidence in one's ability to achieve treatment goals has sometimes been reported as being synonymous with self-efficacy. Visual analogue scale admission measures of confidence for successful treatment completion have positively predicted heroin abstinence 3 months later, but not inpatient methadone detoxification completion.[20,21] Overall, the lack of consistent use of psychometrically validated measures of self-efficacy in studies of opiate withdrawal and abstinence weakens the conclusions possible regarding its role as an outcome predictor for such treatment.

The present multisite study compared patients' self-efficacy scores from a validated psychometric instrument at admission for methadone withdrawal (T1) in three treatment settings. The predictive ability of these scores was subsequently tested at 6-month follow-up (T2) for treatment outcomes, and also for maintenance of contact with T1 treatment services. Predictive ability for the latter outcome was tested due to the risk of contact being lost with patients following OST termination, and the negative consequences which can follow.[8,9] The treatment settings were a prison, a hospital inpatient unit, and a community-based clinic. Self-efficacy does not exist in a psychological

vacuum, and two other aspects of preparedness for treatment examined were mood state, and attributions for treatment outcomes. It may be noted that depression has been associated with on-going opiate misuse,[19,22] while attributions emphasizing taking responsibility for one's treatment progress have been related to favorable outcomes.[23,24] However, such attributions are frequently measured retrospectively, rather than being potential predictors as in this present study. Finally, as variables concerning criminal activity and judicial consequences can impact upon heroin users differently,[25-27] the relationship of such variables to measures of psychological preparedness was also examined.

METHOD

Design and Participants

Treatment setting at T1 was a between-participant independent variable comprising three patient/participant groups recruited from facilities in the north-west of England. The prison group (PG) was recruited from HMP Liverpool, the inpatient group (IG) from a National Health Service (NHS) facility, and the community-based treatment group (CG) from an NHS drug dependency clinic. As access to incarcerated patients was only possible in a male prison, only male participants were recruited in the other treatment settings to avoid gender becoming a confounding variable across settings. All patients were within the first week of a methadone programme orientated toward withdrawal at T1. Recruitment to the study was based upon successive admissions, subject to willingness to participate, and interviewer availability. The total sample for the study at T1 was $N = 72$, with $n = 24$ for each group. The GPower software programme[28] indicated that $n = 24$ would provide power at 0.85 for large effects (ie, $f = 0.40$), for intergroup comparisons comprising three groups with a conventional alpha level of $P \leq .05$. Additionally, the total sample of $N = 72$ would be sufficient for power at 0.85 for two-tailed correlations with an effect size of $r = .35$ and a conventional α level of $P \leq .05$. Decisions concerning regression analyses using T2 variables as outcomes were made on a post hoc basis, subject to the sample size available.

Treatment Protocols

All three treatment settings conformed to UK guidelines for treating drug misuse[5,6] regarding OST, and the need for patient readiness for opiate withdrawal and long-term abstinence. Methadone was prescribed in response to the needs of the individual in all treatment settings, with dosages being dependent upon the severity of withdrawal symptoms. Starting doses were typically in the range of 30 to 50 mg of oral methadone daily. There was a target reduction rate of 2 mg per week for the PG, while the target completion time for the IG was between 3 and 4 weeks. The variability in the

reduction rate for the CG, in response to patient need and distress prevents the reporting of an average or notional rate.

Measures
Psychological Preparedness
Psychological preparedness for treatment at T1 was assessed by the following instruments.

Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES 8D). This self-completion instrument yields scores on three scales representing, respectively, recognition of a drug problem, ambivalence regarding drug use, and taking steps regarding drug use.[29] Higher scores indicated higher levels of these properties.

Drug-Taking Confidence Questionnaire (DTCQ-8). The DTCQ-8[30] is a self-completion measure of confidence for avoiding drug use across eight situations. Total scores pooled across all situations were used, with higher scores indicating higher self-efficacy.

Confidence for Treatment Scale (CTS). The CTS[21] gave patients the following question and instruction: "How confident are you that you will be drug-free following your drug treatment. Place a cross on the line below." The scale comprised a horizontal line 100 mm in length, with the left pole labeled "No confidence," and the right pole labeled "extremely confident." Scores were recorded in millimeters measured from the left pole. Higher scores indicated higher confidence.

Attribution of Treatment Responsibility Scales (ATRS). Based upon the format used by Eiser et al,[31] patients were presented with the question "Many heroin users fail when they try to give up the drug because:" to which they responded on each of five scales. Each scale represented one pole of two bipolar dimensions, these being "internal attribution-external attribution" and "stable attribution-unstable attribution." The five scales presented to participants were: (A) "It is just too difficult for them"; (B) "Because they do not try hard enough"; (C) "Because they do not know the best way to set about it"; (D) "Because of the kind of people they are"; and (E) "Because of bad luck" (external and unstable). The response format for each scale was "1" ("strongly disagree"), "2" ("disagree"), "3" ("neither agree nor disagree"), "4" ("agree"), and "5" ("strongly agree"). Internality scores were calculated by summing the ratings of (B) and (D), and subtracting from this sum, the sum of the ratings of (A) and (C) (ie, Internality = (B + D) − (A + C)). For stability scores the calculation was as follows: Stability = (A + D) − (B + C).

Depression Anxiety Stress Scales (DASS-21). This instrument comprises 21 items, generating subscale measures for depression, anxiety, and stress. Higher scores indicated higher levels of these scale properties.[32]

Background Measures
The Addiction Severity Index (ASI)[33] recorded patients' demographic details, family situations, histories of illegal drug consumption, treatment for drug-related problems, and engagement in criminal behavior.

Procedure
T1 data were collected through structured interviews with patients conducted by a member of the research team (SJ) in a confidential location within the respective treatment settings. Written informed consent was obtained from all patients. Where possible, T2 data were also obtained through interviews conducted in the same facility as T1 interviews. However, T2 interviews were difficult to arrange due to constantly changing residential addresses for patients in the community, which included those discharged from hospital or prison since T1. Consequently, the presentation of T2 data are limited to self-reports of the use or not of heroin since T1, and patients contact status with the service where the T1 withdrawal had started.

Ethical Scrutiny
The data collection procedure was approved by the relevant NHS Research Ethics Committees, prison authorities, and the research ethics scrutiny procedures of Edge Hill University. The rights of all patients regarding confidentiality, withdrawal from the study, anonymity, and protection from harm while participating were respected at all times. Ethical approval did not include access to records of criminal offenses or to patients' treatment notes. However, the Participant Information Sheet emphasized that the researcher had no role in making treatment decisions, and would respect the confidentiality of their data in relation to both their clinicians and legal authorities. It was emphasized, therefore, that there were no incentives to misinform the researcher. Data were stored in accordance with the UK Data Protection Act 1998.

Analytic Strategy
Intergroup comparisons were primarily conducted using between-participants analysis of variances (ANOVAs), with post hoc pairwise comparisons being evaluated as two-tailed against a Bonferroni adjusted α level of $P \leq .017$. Where the assumptions of parametric ANOVA were violated, nonparametric Kruskal-Wallis ANOVAs were conducted, with post hoc comparisons utilizing the Mann-Whitney U test being evaluated in the same way. Relevant correlational analyses were conducted across the whole sample. Logistic regression analyses were conducted on two dependent variables (DV) measured at T2, these being "heroin use or not since T1," and "contact maintained maintenance or not with T1 treatment services." The power and validity of these analyses were protected by minimizing the number of independent variables included as predictors using hierarchical variable entry, so that the ratio of participants per predictor remained as far below the accepted maximum criterion of 10:1 as possible.[34,35]

Variable	Prison group (PG) ($n=24$)	Inpatient group (IG) ($n=24$)	Community group (CG) ($n=24$)	Significance	Post hoc[a] (where appropriate)
A. *Demographic variables*					
Age, y, mean (SD)	38.00 (6.02)	40.13 (5.29)	40.14 (6.82)	$F < 1$	All *ns*
Number currently in a stable relationship[b]	10 [5.33]	2 [5.33]	4 [5.33]	$\chi^2[2, N=72] = 8.357, P = .015$	NA
Number in employment at T1	NA	3	3	NA	NA
Self-reported age in years when school attendance stopped, mean (SD)	14.67 (1.44)	15.46 (1.14)	15.13 (1.19)	Kruskal-Wallis $\chi^2[2, N=72] = 5.545, P = .063$	All *ns*
B. *Crime-related variables*					
Self-reported theft from shops, number of offenses, mean (SD)	18.67 (40.57)	12.21 (17.86)	18.63 (31.44)	Kruskal-Wallis $\chi^2[2, N=72] = 1.71$, *ns*	All *ns*
Self-reported drug offenses, number of offenses, mean (SD)	2.21 (2.70)	0.75 (1.29)	1.63 (2.78)	Kruskal-Wallis $\chi^2[2, N=72] = 6.947, P = .031$	PG vs IG: $P = .010$ PG vs CG: *ns* IG vs CG: *ns*
Self-reported burglaries, number of offenses, mean (SD)	6.92 (8.71)	0.88 (1.49)	3.50 (8.41)	Kruskal-Wallis $\chi^2[2, N=72] = 14.866, P < .000$	PG vs IG: $P < .000$ PG vs CG: $P = .012$ IG vs CG: *ns*
Self-reported violent crimes, number of offenses, mean (SD)	3.25 (4.54)	1.29 (1.37)	1.42 (2.00)	Kruskal-Wallis $\chi^2[2, N=72] = 5.15$, *ns*	All *ns*
Total time in prison in lifetime, mo, mean (SD)	129.21 (102.18)	45.79 (40.69)	55.79 (59.66)	Kruskal-Wallis $\chi^2[2, N=72] = 12.757, P = .002$	PG vs IG: $P = .001$ PG vs CG: $P = .004$ IG vs CG: *ns*
C. *Drug use-related variables*					
Lifetime use of heroin, y, mean (SD)	15.83 (8.71)	16.13 (8.06)	13.00 (8.03)	$F(2, 69) = 1.046$, *ns*	All *ns*
Number of participants using heroin in the 30 days prior to T1[b]	5 [12.7]	15 [12.7]	18 [12.7]	$\chi^2[2, N=72] = 15.492, P < .000$	NA
Number of days on which heroin was used in the 30 days prior to T1, mean (SD)	2.33 (6.72)	10.79 (11.65)	13.63 (12.84)	Kruskal-Wallis $\chi^2[2, N=72] = 15.553, P < .000$	PG vs IG: $P = .002$ PG vs CG: $P < .000$ IG vs CG: *ns*
Heroin use onset age, y, mean (SD)	22.17 (8.94)	24.00 (6.70)	26.68 (9.74)	Kruskal-Wallis $\chi^2[2, N=70] = 2.997$, *ns*	All *ns*
Lifetime use of methadone, y, mean (SD)	7.54 (7.92)	10.25 (8.17)	6.63 (7.10)	Kruskal-Wallis $\chi^2[2, N=72] = 3.192$, *ns*	All *ns*
Daily methadone dosage (ml) at T1, mean (SD)	30.26 (12.73)	26.62 (22.76)	44.48 (18.05)	$F(2, 62) = 5.707, P = .005$, $\eta_p^2 = 0.155$	PG vs IG: *ns* PG vs CG: $P = .012$ IG vs CG: $P = .002$

(Continued)

TABLE 1. Continued

Variable	Prison group (PG) (n = 24)	Inpatient group (IG) (n = 24)	Community group (CG) (n = 24)	Significance	Post hoc[a] (where appropriate)
Number of days in the 30 days prior to T1 in receipt of methadone treatment, mean (SD)	28.08 (6.81)	19.08 (13.35)	27.50 (8.47)	Kruskal-Wallis $\chi^2[2, N = 72] = 12.528$, $P = .002$	PG vs IG: $P = .004$ PG vs CG: ns IG vs CG: $P = .007$
Number of participants using alcohol in the 30 days prior to T1[b]	1 [7.3]	7 [7.3]	14 [7.3]	$\chi^2[2, N = 72] = 16.625$, $p < .000$	NA
Number of days alcohol used in the 30 days prior to T1, mean (SD)	0.58 (2.86)	3.63 (8.14)	9.71 (13.43)	Kruskal-Wallis $\chi^2[2, N = 72] = 17.071$, $P < .000$	PG vs IG: ns PG vs CG: $P < .000$ IG vs CG: ns
Number of participants using cannabis in the 30 days prior to T1[b]	4 [6.67]	8 [6.67]	8 [6.67]	$\chi^2[2, N = 72] = 2.15$, ns	NA
D. Treatment preparedness variables					
SOCRATES: problem recognition, mean (SD)	29.08 (4.34)	31.04 (3.26)	28.17 (4.16)	$(F(2, 69) = 3.319$, $P = .042$, $\eta_p^2 = 0.088$	PG vs IG: ns PG vs CG: ns IG vs CG: $P = .014$
SOCRATES: ambivalence, mean (SD)	16.17 (2.67)	16.33 (2.08)	16.33 (1.83)	$F < 1$	All ns
SOCRATES: taking steps, mean (SD)	34.88 (3.54)	34.33 (3.40)	33.29 (3.64)	$F(2, 69) = 1.249$, ns	All ns
DTCQ-8, mean (SD)	320.00 (246.37)	573.33 (235.88)	400.00 (288.20)	$F(2, 69) = 6.056$, $P = .004$, $\eta_p^2 = 0.149$	PG vs IG: $P = .001$ PG vs CG: ns IG vs CG: ns
ATRS: internality score, mean (SD)[c]	7.29 (1.76)	6.46 (2.47)	7.54 (2.52)	Kruskal-Wallis $\chi^2[2, N = 72] = 1.297$, ns	All ns
ATRS: Stability score, mean (SD)[c]	6.79 (2.21)	6.04 (1.92)	6.38 (1.72)	Kruskal-Wallis $\chi^2[2, N = 72] = 2.283$, ns	All ns
ATRS: Luck score, mean (SD)	2.58 (1.02)	1.88 (0.80)	2.58 (1.14)	Kruskal-Wallis $\chi^2[2, N = 72] = 6.816$, $P = .033$	All ns
DASS-21: depression, mean (SD)	6.54 (6.01)	6.33 (4.72)	5.96 (4.29)	$F < 1$	All ns
DASS-21: anxiety, mean (SD)	6.08 (6.35)	5.50 (4.54)	5.41 (5.61)	Kruskal-Wallis $\chi^2[2, N = 70] = 0.148$, ns	All ns
DASS-21: stress, mean (SD)	8.29 (5.61)	7.08 (6.05)	6.50 (5.02)	$F < 1$	All ns
CTS ratings, mean (SD)	51.75 (33.53)	77.83 (27.03)	66.42 (30.28)	Kruskal-Wallis $\chi^2[2, N = 72] = 7.252$, $P = .027$	PG vs IG: $P = .009$ PG vs CG: ns IG vs CG: ns

ATRS = Attribution of Treatment Responsibility Scales; CTS = Confidence for Treatment Scale; DASS-21 = Depression Anxiety Stress Scales; DTCQ-8 = Drug-Taking Confidence Questionnaire; SOCRATES = Stages of Change Readiness and Treatment Eagerness Scale.

[a]All probability values are two-tailed.

[b]Expected value E under H0 of no association with participant group is shown in square brackets.

[c]A constant of 7.00 was added to avoid negative scores. The minimum score = 1.

RESULTS

Background and Drug Misuse-Related Variables at T1

The mean period of current incarceration for PG patients at T1 was 6.63 months (SD = 8.58 months). Table 1 (Sections A to C) summarizes results for background and drug misuse variables. The post hoc comparisons show that the PG had committed more drug offenses than the IG. PG patients had also committed more burglaries and had longer total imprisonment durations than the other groups. Regarding drug consumption, the PG reported less heroin consumption than the other groups in the 30 days prior to T1, but reported the highest prevalence of cocaine consumption within this timeframe. CG patients were receiving significantly higher daily methadone doses at T1 than the other groups.

Treatment Preparedness Variables at T1

Table 1 (Section D) summarizes results for the treatment preparedness variables at T1. The IG scored significantly higher than the PG on both the DTCQ-8 and CTS, while also scoring significantly higher on the SOCRATES problem recognition scale than the CG. There were no significant intergroup differences on the other SOCRATES scales, or for any of the mood and attribution scales. Table 2 summarizes the significant correlations between treatment preparedness variables and demographic, crime-related, and drug misuse variables, across the whole sample. Age was negatively correlated with both the SOCRATES ambivalence and taking steps scales, while self-efficacy was negatively correlated with lifetime duration in prison, and the number of days in the previous 30 days on which heroin and methadone, respectively, had been used.

Heroin Use Between T1 and T2

Sample attrition meant that T2 data were only available from 48 patients comprising 13 PG, 18 IG, and 17 CG patients. Three of the 24 patients lost to the study at T2 were contactable but declined to participate, with contact being lost with the remainder (ie, $n = 21$; 29.2% of the T1 sample) by both the researcher and the treatment services supervising the withdrawal at T1. Only 15 of the 48 patients retained at T2 reported having remained heroin-free since T1, with 10 of these being either in prison or receiving continuing medication from drug services. Of the 33 patients who had used heroin since T1, 29 were either in prison or receiving continuing support from drug services. Where data were available, use of heroin or not since T1 was not associated with treatment setting ($\chi^2[2, N = 48] = 4.778$, ns).

Hierarchical logistic regression analyses for the prediction of heroin use or not since T1 were conducted with a limit of two independent variables at one time to preserve statistical power. Of the five variables in Table 3 (Section A) showing significant (or near to significant) T2 differences in measures taken at admission, CTS ratings were excluded from the regression analyses due to high correlations with the other variables. The DTCQ-8 scores were entered in model 1, and yielded a significant improvement in outcome prediction (ie, compared with random prediction (model $\chi^2[1, N = 48] = 4.831$, $P = .028$, -2 log likelihood = 54.794, Cox and Snell $R^2 = .096$). Model 2 comprised, successively, the other variables in Table 3 (Section A), one at a time. None of these variables significantly improved the prediction of relapse compared to Model 1. Further details of model 1 are shown in Table 4 (Section A) where the positive B coefficient for DTCQ-8 scores indicates that higher scores were related to an increased likelihood of no further heroin use since T1.

TABLE 2. Significant correlations at T1 for the treatment preparedness variables with variables in Table 1 recording demographic status, drug use, and criminal engagement

Treatment preparedness variable	Variable from Table 1	Correlation[a]
SOCRATES: ambivalence	Age	$r(70) = -.245$, $P = .041$
SOCRATES: taking steps	Age	$r(70) = -.270$, $P = .024$
	Number of days of heroin use in the 30 days prior to T1	$r_s(72) = -.278$, $P = .018$
DTCQ-8	Lifetime duration in prison	$r_s(72) = -.230$, $P = .052$
	Number of days of heroin use in the 30 days prior to T1	$r_s(72) = -.239$, $P = .044$
	Number of days of methadone use in the 30 days prior to T1	$r_s(72) = -.405$, $P < .000$
ATRS: luck	Daily methadone doses at T1	$r_s(65) = .344$, $P = .005$
	Number of days of methadone use in the 30 days prior to T1	$r_s(72) = -.232$, $P = .050$
DASS-21 anxiety	Number of thefts from shops	$r_s(70) = -.240$, $P = .046$
DASS-21 stress	Number of thefts from shops	$r_s(70) = -.316$, $P = .008$
	Number of burglaries	$r_s(70) = -.228$, $P = .057$
CTS	Estimated lifetime duration of heroin use	$r_s(72) = -.229$, $P = .052$

Three correlations are also reported here with P values between .05 and .06.

ATRS = Attribution of Treatment Responsibility Scales; CTS = Confidence for Treatment Scale; DASS-21 = Depression Anxiety Stress Scales; DTCQ-8 = Drug-Taking Confidence Questionnaire; SOCRATES = Stages of Change Readiness and Treatment Eagerness Scale.

[a]All probability values reported here are two-tailed.

TABLE 3. Variables measures at T1 (means and (SD)) showing significant differences for (A) T2 relapse or not and (B) maintenance of contact or not with T1 services and the researcher at T2

A. Variables measured at T1 showing significant differences between relapse or not at T2

Variable	No heroin use since T1 ($n = 15$)	Heroin used since T1 ($n = 33$)	Significance[a]
SOCRATES taking steps	35.60 (3.25)	33.49 (3.52)	$t(46) = -1.975$, $P = .054$, $d = 0.625$
DTCQ-8	570.67 (252.18)	380.61 (286.60)	$t(46) = -2.207$, $P = .032$, $d = 0.704$
CTS ratings	80.20 (27.88)	58.70 (30.96)	$U = 136.00$, $P = .012$,
Number of days on which heroin was used in the 30 days prior to T1	3.93 (8.23)	11.70 (12.70)	$U = 152.00$, $P = .025$
Number of days in the previous 30 days at T1 in receipt of methadone treatment	19.80 (14.26)	25.90 (9.92)	$U = 185.00$, $P = .058$

B. Variables measured at T1 showing significant differences between patients maintaining contact or not with T1 services and the researcher at T2

Variable	Contactable at T2 ($n = 48$)	Not contactable at T2 ($n = 21$)	Significance[a]
Age	40.77 (6.01)	36.00 (5.27)[b]	$t(66) = 2.699$, $P = .009$, $d = 0.738$
Lifetime use of heroin, y	16.63 (7.33)	11.76 (9.76)	$t(67) = 2.286$, $P = .025$, $d = 0.564$
SOCRATES: ambivalence	15.92 (2.01)	17.05 (2.54)	$t(67) = -2.146$, $P = .035$, $d = 0.494$

CTS = Confidence for Treatment Scale; DTCQ-8 = Drug-Taking Confidence Questionnaire; SOCRATES = Stages of Change Readiness and Treatment Eagerness Scale.

[a]All probability values are two-tailed.

[b]$n = 20$ for this comparison.

Maintenance of Contact With T1 Treatment Services at T2

Patients' maintenance of contact with T1 treatment services was not associated with treatment setting ($\chi^2[2, N = 72] = 2.625$, ns). Table 3 (Section B) shows the three variables with significant T2 differences in measures taken at admission between patients maintaining contact or not. As there were only three variables showing significant differences, they were entered as a block of independent variables in a logistic regression analysis using maintenance of contact or not as the dichotomous DV. This yielded a significant improvement in the prediction of contact maintenance T2 (model $\chi^2[1, N = 68] = 11.990$, $P = .007$, -2 log likelihood = 70.399, Cox and Snell $R^2 = .162$). Further details of this model are

TABLE 4. Details of the logistic regression analysis models for (A) predicting heroin use or not at T2 and (B) maintenance of contact or not with T1 services and the researcher at T2

Variable	B	SE	Wald χ^2	df	Sig.	Odds ratio (e^B)
A. *Dependent variable: Heroin used = 0; heroin not used = 1*						
DTCQ-8	0.003	0.001	4.247	1	.039	1.003
Constant	−2.026	0.728	7.747	1	.005	0.132
B. *Dependent variable: Contact maintained = 0; contact lost = 1*						
Age	−0.088	0.056	2.457	1	0.117	0.916
Heroin lifetime use	−0.047	0.038	1.561	1	0.211	0.954
SOCRATES: ambivalence	0.246	0.144	2.929	1	0.087	1.278
Constant	−0.855	3.338	0.066	1	0.798	0.425

CTS = Confidence for Treatment Scale; DTCQ-8 = Drug-Taking Confidence Questionnaire; SOCRATES = Stages of Change Readiness and Treatment Eagerness Scale.

shown in Table 4 (Section B). None of these independent variables had significant Wald χ^2 values.

DISCUSSION

The present findings show that self-efficacy measured at T1 by the DTCQ-8[30] was an effective predictor of subsequent self-reported heroin use or not at a 6-month follow-up. T1 intergroup comparisons showed that the IG scored significantly more highly than the PG on this measure, and also on the CTS. This result adds to the existing literature concerning the predictive relationship of self-efficacy and confidence measures for successful treatment completion, to outcomes concerning methadone withdrawal and the maintenance of abstinence.[18-21] Of particular note is that these findings came from a robust psychometric instrument for measuring self-efficacy rather than an ad hoc scale.[19,30] These results suggest that self-efficacy is a measurable variable potentially usable by clinicians as an indicator of patients' preparedness for completing a methadone withdrawal programme and remaining heroin-free. Its use as such would, however, need to be as part of a battery of indicators informing clinical judgment regarding patients' preparedness for opiate abstinence and the gradual removal of OST, in accordance with clinical guidelines.[5,6] As the present data do not indicate whether patients high in self-efficacy sought an inpatient setting, whether the inpatient setting boosted patients' self-efficacy, or whether a synergistic interaction of these two explanations occurred, further research is required to examine the implications for clinical practice regarding the effective development of patients' self-efficacy across different treatment settings, in addition to the use in practice of self-efficacy measures as indicators of treatment preparedness.

Psychological preparedness for opiate withdrawal and abstinence is a complex construct where self-efficacy does not function alone. DTCQ-8 scores were negatively correlated with methadone treatment duration in the 30 days prior to T1. This may reflect a need to obtain sufficient personal and lifestyle stability through OST before withdrawal and abstinence become conscionable objectives to patients, thus reflecting the preparedness required for ceasing OST highlighted in clinical guidelines.[5,6] The strong positive correlation between T1 methadone doses and attributions to luck for treatment success may similarly reflect a lack of preparedness, and a risk of the negative outcomes associated with OST termination without adequate preparation.[8,9] Psychological preparedness is also related to the broader social context of patients' lives, as shown by the negative correlation (approaching statistical significance) between lifetime duration in prison and both DTCQ-8 and CTS scores. The PG scored worse on both of these preparedness variables than the IG. This suggests that limitations to drug availability through being in prison were not associated with enhancing treatment preparedness, which

would be consistent with the negative consequences of premature OST termination in prison reported elsewhere. Prison incarceration has been shown to weaken relationships with people and activities not associated with crime, and to reduce prospects for legitimate employment.[27] Such consequences may be related negatively to treatment preparedness, which, in turn, highlights the need for an integrated network of clinical and social care provision for patients with addiction problems.[5,6] In summary, low DTCQ-8 scores may indicate the appropriateness of deferring OST termination and the initiation of opiate withdrawal, in favor of interventions to raise self-efficacy for a subsequent withdrawal.

This study provided no evidence of emotional states predicting outcomes for methadone withdrawal and abstinence, despite evidence for emotions playing an important role in addictive behaviors.[19,22] This role may not, therefore, include mediation of outcomes for specific withdrawal episodes. The lack of a difference in depression between the PG and the other groups at T1 is noteworthy, given the constraints of a prison environment. Additionally, no relationship between T1 attributions for treatment outcomes, and subsequent actual outcomes were found. Although this suggests that such attributions at admission do not have predictive value, this does not limit the indicative value of attributions for progress and outcomes recorded later in the treatment process.[23,24]

OST termination can lead to loss of contact with treatment services and negative outcomes arising from continued opiate use.[8,9] Although no variables concerning methadone treatment were related to maintaining contact or not with T1 services in the present sample, higher SOCRATES ambivalence scores and younger age were related to this outcome. These relationships could indicate a lack of preparedness for the opiate abstinence treatment available. For patients who remained in contact with T1 services, these two variables, which were negatively correlated with each other, were not related to reported heroin use between T1 and T2. Their role as predictor variables may therefore be limited to maintaining contact or not with services.

This study has some important limitations. Sample attrition was a challenge to T2 data collection, with some nonsignificant results possibly being due to low statistical power. However, attention to maintaining statistical power in the logistic regression analyses did lead to meaningful findings. As only male participants were studied, further research is required concerning preparedness indicators for comparable interventions for female patients. There was also reliance on self-reported data regarding drug use and crime. However, this is not uncommon in the literature. Toxicological verification of abstinence is not always possible, and may not be ethically desirable following treatment termination with regard to maintaining mutual respect between former patients and professionals.

In conclusion, this study highlighted self-efficacy beliefs for treatment outcomes as potential predictors for

opiate withdrawal modified by methadone and subsequent abstinence. Patients' age and ambivalence regarding change emerged as potential predictors for maintaining contact with treatment services.

Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper.

REFERENCES

1. Wesson DR, Ling W. The Clinical Opiate Withdrawal Scale (COWS). *J Psychoactive Drugs*. 2003;35:253-259. https://doi.org/10.1080/02791072.2003.10400007

2. Tasić JK, Valkanou MK, Đukanović B, et al. Relapse risk factors in heroin addicts treated with naltrexone and naltrexone-behavioural psychotherapy. *Int J Ment Health Ad*. 2018;16:351-365. https://doi.org/10.1007/s11469-017-9782-7

3. Liu S, Li L, Shen W, et al. Scopolamine detoxification technique for heroin dependence: a randomized trial. *CNS Drugs*. 2013;27:1093-1102.

4. Hammerbacher M, Lyvers M. Factors associated with relapse among clients in Australian substance disorder treatment facilities. *J Subst Use*. 2006;11:387-394. https://doi.org/10.1080/14659890600708266

5. Department of Health (England) and Devolved Administrations. *Drug Misuse and Dependence: UK Guidelines on Clinical Management.* London: Department of Health (England), the Scottish Government, Welsh Assembly Government and Northern Ireland Executive; 2007. http://webarchive.nationalarchives.gov.uk/20170807160700/; http://www.nta.nhs.uk/uploads/clinical_guidelines_2007.pdf. Accessed 31 January 2018.

6. Clinical Guidelines on Drug Misuse and Dependence Update 2017 Independent Expert Working Group. Drug misuse and dependence: UK guidelines on clinical management. London: Department of Health; 2017. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/668611/clinical_guidelines_2017.pdf. Accessed 31 January 2018.

7. House of Commons. Home affairs committee—Ninth report. Drugs: breaking the cycle. https://publications.parliament.uk/pa/cm201213/cmselect/cmhaff/184/18402.htm. Accessed 31 May 2018.

8. Maradiaga JA, Nahvi S, Cunningham CO, et al. "I kicked the hard way. I got incarcerated." Withdrawal from methadone during incarceration and subsequent aversion to medication assisted treatments. *J Subst Abuse Treat*. 2016;62:49-54.

9. Rich JD, McKenzie M, Larney S, et al. Methadone continuation versus forced withdrawal on incarceration in a combined US prison and jail: a randomised, open-label trial. *Lancet*. 2015;386:350-359.

10. Disbury KL, Kopak AM, Dean LV, et al. Pre- to posttreatment differences in measures of risk of relapse and reoffending for participants of RAPt's 6-week programs. *J Offender Rehabil*. 2015;54:556-584. https://doi.org/10.1080/10509674.2015.1087443

11. Doyle SR, Donovan DM. Applying an ensemble classification tree approach to the prediction of completion of a 12-step facilitation intervention with stimulant abusers. *Psychol Addict Behav*. 2014;28:1127-1143. https://doi.org/10.1037/a0037235

12. Kouimtsidis C, Reynolds M, Coulton S, et al. How does cognitive behaviour therapy work with opioid-dependent clients? Results of the UKCBTMM study. *Drug Educ Prev Policy*. 2012;19:253-258. https://doi.org/10.3109/09687637.2011.579194

13. Bandura A. Perceived self-efficacy in the exercise of personal agency. *Psychologist*. 1989;2:411-424.

14. Ayres R, Ingram J, Rees A, et al. Enhancing motivation within a rapid opioid substitution treatment feasibility RCT: a nested qualitative study. *Subst Abuse Treat Prev Policy*. 2014;9:44.

15. Li L, Wu Z, Liang LJ, et al. An intervention targeting service providers and clients for methadone maintenance in China: a cluster-randomised trial. *Addiction*. 2013;108:356-366. https://doi.org/10.1111/j.1360-0443.2012.04020.x

16. Wong EC, Longshore D. Ethnic identity, spirituality, and self-efficacy influences on treatment outcomes among Hispanic American methadone maintenance clients. *J Ethn Subst Abuse*. 2008;7:328-340. https://doi.org/10.1080/15332640802313478

17. Barta WD, Kurth ME, Stein MD, et al. Craving and self-efficacy in the first five weeks of methadone maintenance therapy: a daily process study. *J Stud Alcohol Drugs*. 2009;70:735-740.

18. Reilly PM, Sees KL, Shopshire MS, et al. Self-efficacy and illicit opioid use in a 180-day methadone detoxification treatment. *J Consult Clin Psychol*. 1995;63:158-162.

19. Kenny SR, Bailey GL, Anderson BJ, et al. Heroin refusal self-efficacy and preference for medication-assisted treatment after inpatient detoxification. *Addict Behav*. 2017;73:124-128.

20. Murphy PN, Bentall RP. Opiate withdrawal outcome: the predictive ability of admission measures of motivation, self-efficacy, and lifestyle stability. *Subst Use Misuse*. 1997;32:1587-1597.

21. Murphy PN, Bentall RP, Ryley LD, et al. Predicting post-discharge opiate abstinence from admission measures of motivation and confidence. *Psychol Addict Behav*. 2003;17:167-170.

22. Bouvier BA, Kinnard EN, Yedinak JL, et al. Prevalence and correlates of depressive symptomology among young adults who use prescription opioids non-medically. *J Psychoactive Drugs*. 2019;51:441-452. https://doi.org/10.1080/02791072.2019.1654151

23. Ravenna M, Hölzl E, Kirchler E, et al. Drug addicts in therapy—changes in life space in the course of one year. *J Community Appl Soc Psychol*. 2002;12:353-368.

24. Flynn PM, Joe GW, Broome KM, et al. Looking back on cocaine dependence: reasons for recovery. *Am J Addict*. 12, 2003:398-411.

25. Best D, Day E, Homayoun S, et al. Treatment retention in the Drug Intervention Programme: do primary drug users fare better than primary offenders? *Drug Educ Prev Policy*. 2008;15:201-209. https://doi.org/10.1080/09687630701198165

26. Nurco DN. A long-term program of research on drug use and crime. *Subst Use Misuse*. 1998;33:1817-1837. https://doi.org/10.3109/10826089809059323

27. Weaver B, Armstrong S. User views of punishment—the dynamics of community-based punishment: insider views from the outside. The Scottish Centre for Crime and Justice Research. http://www.sccjr.ac.uk/wp-content/uploads/2012/11/Report_2011_03_User_Views_of_Punishment-1.pdf

28. Faul F, Erdfelder E, Lang A-G, et al. G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav Res Methods*. 39, 2007:175-191.

29. Miller WR, Tonigan JS. Assessing drinkers' motivation to change: the States of Change Readiness and Treatment Eagerness Scale (SOCRATES). *Psychol Addict Behav*. 1996;10:81-89.

30. Sklar SM, Turner NE. A brief measure for the assessment of coping self-efficacy. *Addiction*. 1999;94:723-729.

31. Eiser JR, van der Plight J, Raw M, et al. Trying to stop smoking: effects of perceived addiction, attribution for failure, and expectancy of success. *J Behav Med*. 8, 1985:321-341.

32. Henry JD, Crawford JR. The short formed version of the Depression Anxiety Stress Scales (DASS-21): construct validity and normative data in a large non-clinical sample. *Br J Clin Psychol*. 44, 2005: 227-239.

33. McLellan AT, Cacciola JC, Alterman AI, et al. The Addiction Severity Index at 25: origins, contributions and transitions. *Am J Addict*. 2006;15:113-124.

34. Perduzzi P, Concato J, Kemper E, et al. A simulation study of the number of events per variable in logistic regression analysis. *J Clin Epidemiol*. 1996;49:1373-1379.

35. Vittinghoff E, McCulloch CE. Relaxing the rule of ten events per variable in logistic and Cox regression. *Am J Epidemiol*. 2006;2006:710-718.