

Patients' beliefs towards contingency management: Target behaviours, incentives and the remote application of these interventions

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Abstract

Introduction. Contingency management interventions are among the most efficacious psychosocial interventions in promoting abstinence from smoking, alcohol and substance use. The aim of this study was to assess the beliefs and objections towards contingency management among patients in UK-based drug and alcohol services to help understand barriers to uptake and support the development and implementation of these interventions. **Methods.** The Service User Survey of Incentives was developed and implemented among patients (N = 181) at three UK-based drug and alcohol treatment services. Descriptive analyses were conducted to ascertain positive and negative beliefs about contingency management, acceptability of different target behaviours, incentives and delivery mechanisms including delivering incentives remotely using technology devices such as mobile telephones. **Results.** Overall, 81% of participants were in favour of incentive programs, with more than 70% of respondents agreeing with the majority of positive belief statements. With the exception of two survey items, less than a third of participants agreed with negative belief statements. The proportion of participants indicating a neutral response was higher for negative statements (27%) indicating greater levels of ambiguity towards objections and concerns regarding contingency management. **Discussion and Conclusions.** Positive beliefs towards contingency management interventions were found, including high levels of acceptability towards a range of target behaviours, incentives and the use of technology devices to remotely monitor behaviour and deliver incentives. These findings have implications for the development and implementation of remote contingency management interventions within the UK drug treatment services. [Getty C-A, Weaver T, Lynskey M, Kirby KC, Dallery J, Metrebian N. Patients' beliefs towards contingency management: Target behaviours, incentives and the remote application of these interventions. *Drug Alcohol Rev* 2022;41:96–105]

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Introduction

Contingency management (CM) interventions, based on the scientific principles of operant conditioning, involve the application of positive reinforcement contingent upon behaviour change. CM is among the most efficacious psychosocial interventions in promoting abstinence from smoking, alcohol and illicit drugs [1–7]. While CM has a strong evidence base, acceptability of these interventions among staff and patients is vital. Capturing their views and attitudes can support CMs implementation into routine service provision, ensuring the development and delivery of interventions

that are consistent with patients' and staff's idea of appropriate treatment.

While prior research, predominately surveying treatment providers in the USA, demonstrates support for CM with the majority endorsing favourable opinions towards these interventions [8,9], several concerns have been highlighted. These include issues related to the practicality of implementing CM, lack of sustained treatment effects and economic evaluations, and ethical objections towards the use of financial incentives to reinforce behaviour change [8–14]. These factors might be impeding the uptake and implementation of CM within clinical practice in the UK and

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international addiction services and need to be addressed prior to implementation efforts.

In addition, patients' beliefs towards CM have not been widely investigated. Research has been limited to surveys examining acceptability of study procedures among patients in receipt of CM in the USA [15–19] and a small UK-based qualitative investigation [20]. These studies found that patients view CM as a motivating and positive tool to facilitate recovery and the monitoring of behaviours and financial incentives are strengths of the intervention [16]. However, these beliefs are most likely to be affected by multiple contextual factors. For example, there are many differences between the UK and US health-care systems and understanding acceptability among patients within UK substance use services might further illuminate beliefs in a UK-specific context. Additionally, it will be helpful to assess if patient's beliefs and objections towards CM are associated with different patient characteristics (e.g. length of time in treatment and age) as associations between positive beliefs and several characteristics of treatment providers have previously been found [8,21].

The use of technology to facilitate the application of CM to improve health-related behaviours such as abstinence is a growing area of research [22]. Remote applications of CM have been developed to enhance the reach of these interventions, enabling patients to stay in contact with services when engagement is variable or intermittent over a long period [23]. Technology might optimise the application of reinforcement principles, monitoring and reinforcing the target behaviour more frequently than is otherwise possible [22,24]. A meta-analysis of mobile telephone-delivered CM [25] and more recent evaluation studies [19,26–30] suggest these interventions are effective in generating positive behaviour change. However, the platforms upon which these interventions can be implemented might vary in their appropriateness or acceptability to the patient population. Research exploring patients' acceptability towards these modern modalities (which are typically automated with limited human interaction) has been confined to explorations of acceptability among participants in the context of existing studies in the USA [31–33].

The aim of this study was to explore beliefs towards CM among patients receiving treatment for substance use disorders (SUD) in UK addiction services. Specific objectives included assessing: beliefs and objections towards CM; acceptability of social and tangible rewards; acceptability of targeting different substance related behaviours; and acceptability of using technology to remotely monitor behaviour and deliver incentives. The associations between patient characteristics and beliefs were also explored.

Method

Participants

Participants were patients receiving treatment for SUDs in three London drug services. The clinics are managed by the South London & Maudsley National Health Service Foundation Trust who provides the widest range of National Health Service mental health services in the UK, offering specialist in-clinic and outpatient services to help patients with SUD in reducing or stopping their use and minimising the associated harm. Participants were eligible to take part if they were receiving treatment, fluent in English and over the age of 18.

Procedure

Patients were approached by the researcher while waiting in the clinic reception for their appointment, informed about the study and provided with an information sheet. Following informed consent, the questionnaire was provided to the participant and completed at the clinic (with the researcher if requested). To encourage participation, entry to a prize draw to win a £50 gift voucher was offered.

Service User Survey of Incentives

The questionnaire was created in collaboration with the author of the Provider Survey of Incentives (PSI): a 44-item scale assessing beliefs held by treatment providers regarding CM [8]. The research team created a pool of question items from the PSI and rated each item for importance on a 5-point scale. Overlapping items and those rated as low importance to service users were removed. Question items were selected based on their relevance to a patient population and those specific to health-care providers were omitted. Language was modified for a UK patient group. Authors of the PSI indicated that the structure of the questionnaire of asking the same questions for social and tangible incentives separately could have created a contrast effect, such that one type of incentive would be favoured over the other. This limitation was taken into consideration and tangible incentives were focused on. The Service User Survey of Incentives (SUSI) was developed, consisting of 18-items categorised into four themes: limitations of incentive programs, ethical/moral objections, negative side effects and positive opinions regarding incentives.

The questionnaire consisted of four parts and provided a brief description of CM to ensure participants were aware of its key features, including frequency and delivery of the reinforcer contingent on objective verification of the target behaviour. Part A contained two

questions to measure awareness and experience of CM incentives. Part B contained the 18-item SUSI to ascertain beliefs and objections towards CM. Part C contained five sets of questions: two specific to attitudes towards different types of rewards and target behaviours, while three questions were specific to the remote application of CM. Participants were required to indicate their level of agreement with each survey item on a 5-point Likert scale [(strongly) disagree, neutral, (strongly) agree]. Part D contained questions regarding basic demographics and treatment history.

Data analysis

The proportion of participants indicating agreement, disagreement or neutral responses to the individual items were calculated for descriptive purposes. Items on the SUSI were categorised according to the four themes: positive beliefs (items 1, 3, 5, 10, 11, 12, 15, 16, 17 and 18), limitations of incentive programs (items 6, 9 and 14), ethical/moral objections (items 2, 7 and 8) and negative side effects (items 4 and 13) with summary scores pooled for descriptive purposes. Variables were recoded, grouping levels of agreement (strongly disagree/disagree and strongly agree/agree) to aid comparison across items and subscales.

Positive and negative belief items were grouped, summary scores calculated and associations with participant characteristics explored. Reliability analyses were carried out on the two subscales to assess the internal validity and appropriateness of congregating survey items. Cronbach's alpha showed the positive beliefs subscale (10 items: 1, 3, 5, 10, 11, 12, 15, 16, 17, 18) and the negative beliefs subscale (8 items: 2, 4, 6, 7, 8, 9, 13, 14) reached good reliability; $\alpha = 0.88$, $\alpha = 0.79$, respectively. Inter-item correlations indicated that all items are worthy of retention, resulting in a decrease in the alpha if deleted. Missing values were coded as missing in SPSS and analyses were conducted using the available data.

Participants were divided by age, and into four groups based on their length of time in treatment: (<1 year, 1–5 years, 5–10 years, >10 years). Pearson chi-square analyses examined associations between awareness and experience of CM, specific participant characteristics and the repeated dependent variable (SUSI subscale score) to determine if they were associated with differences in beliefs.

Ethical considerations

The project received ethical approval from the London Chelsea National Health Service Research Ethics Committee (19/LO/1590).

Results

Participant demographics and substance use characteristics

Participants ($N = 181$) were recruited between November 2019 and March 2020. Participants were male (63%), White (74%), with a median age of 45 years (interquartile range 53–37). Participants were currently receiving treatment for a range of substances, heroin (54%) and alcohol (39%) being the two most reported. Time in treatment ranged from 1 month to 50 years (median 5, interquartile range 15–0.9) (Table 1).

Mobile phone ownership

Mobile phone ownership was high (96%). Of those, 85% owned smartphones and 56% had a monthly contract plan, while 27% reported to changing their mobile number in the last year. Most participants (94%) reported that they would be comfortable with their treatment provider contacting them on their mobile phone, but only 31% said they would be comfortable with the use of geo-location for treatment purposes.

Awareness and experience of incentive interventions

Overall, 33% of participants reported being aware of CM interventions. However, only 8% reported they had experienced it.

Positive and negative beliefs towards CM

Table 2 shows the percentages of participants indicating agreement, disagreement or neutral responses to individual survey items.

Positive beliefs. Overall, high proportions of participants agreed with statements expressing positive beliefs regarding CM, with 81% indicating that they would be 'in favour of incentive programmes'. With the exception of 2 of the 10 survey items, over 70% of respondents agreed with all positive belief statements. Statements that were among the most highly endorsed were that 'incentives are useful if they reward service users for fulfilling health care goals...' and 'incentives are more likely to have positive effects... than they are to have negative effects'. Less endorsed statements included 'incentives are good for the service user-recovery worker relationship' and 'incentives can be useful whether or not they address the underlying reasons for engaging in unhealthy behaviour', with 65% and 48% of

Table 1. Participant characteristics

Variable	Median (IQR)	N (%)
Age, years	45 (53–37)	
Gender		
Male		114 (63%)
Female		67 (37%)
Ethnicity		
White		133 (73.5%)
Black		14 (7.7%)
Asian		6 (3.3%)
Other		28 (15.5%)
Employment status		
Employed		55 (30.4%)
Unemployed/sickness		105 (58.0%)
Student		5 (2.8%)
Housewife/husband		5 (2.8%)
Retired		6 (3.3%)
Other		2 (1.1%)
Accommodation status		
Owner occupied		17 (9.7%)
Rented private		53 (30.1%)
Rented (LA, HA)		73 (41.5%)
Living with parents/relatives		17 (9.7%)
B&B/hotel		2 (1.1%)
Hostel		5 (2.8%)
NFA (living on the streets)		6 (3.4%)
Other		3 (1.7%)
Length of time in treatment for SUD in the UK	5 (15–0.9)	
Substance(s) receiving treatment for (multiple substances could be indicated)		
Tobacco		20 (11.1%)
Cannabis		28 (15.6%)
Synthetic cannabinoids		2 (1.1%)
Benzodiazepines		19 (10.6%)
Heroin		98 (54.4%)
Morphine		13 (7.2%)
Codeine		14 (7.8%)
Alcohol		71 (39.4%)
Crack		52 (28.9%)
Cocaine		47 (26.1%)
Amphetamines		10 (5.6%)

HA, housing association; IQR, interquartile range; LA, local authority; NFA, no fixed abode.

participants respectively indicating agreement. The proportion of participants indicating a neutral response across the survey items averaged 17%.

Negative beliefs. With the exception of two survey items, less than 30% of participants agreed with negative belief statements. While more than 50% of participants disagreed with only three out of eight negative statements, 27% of participants indicated a neutral response, suggesting greater levels of ambiguity about objections towards CM.

The most frequently endorsed negative belief statement was that ‘incentives are most useful for short-term purposes...’ with 38% agreeing with this statement. Statements pertaining to ethical and moral concerns were among the least endorsed. Only 11% of participants agreed with the statement ‘incentives are offensive to me because they are a bribe’. Other statements expressing ethical concerns about the appropriateness of incentives (incentives ‘...conflicts with my idea of

appropriate treatment’ and ‘it is not right to give incentives to service users for what they should be doing...’) received modest endorsement, with 26% and 20% respectively agreeing with these statements.

Statements alluding to the negative side effects of CM were among the most supported negative items. Twenty-eight percent of participants agreed with the statement ‘incentives will stop the service user from realising their internal motivation to engage in healthy behaviours’. The second most endorsed negative belief (32%) was that ‘most service users would sell or exchange incentives ... [and] use the money to engage in substance use’.

Acceptability towards CM mechanisms

Table 3 shows the percentages of participants indicating agreement, disagreement or neutral responses to each individual item.

Table 2. Percentage of participants agreeing with Provider Survey of Incentives items

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
<i>Positive beliefs</i>						
1	Incentives are worthwhile because they can get reluctant service users in the door for treatment.	1.1	6.1	20.4	44.2	28.2
3	Incentives are good for the service user–recovery worker relationship.	2.8	5.5	26.5	45.3	19.9
5	Incentives are more likely to have positive effects on the service user than they are to have negative effects.	0.6	4.4	18.8	53.0	23.2
10	I would be in favour of incentives to build healthy behaviours for service users.	0.6	6.6	11.0	53.0	28.7
11	Incentives are useful if they reward service users for fulfilling a health-care goal, such as attending appointments, engaging in physical exercise, or taking medication as prescribed.	1.1	5.0	7.2	57.5	29.3
12	An advantage of incentive programs is that they focus on what is ‘good’ in the service user’s behaviour (e.g. treatment compliance, drug free urines/abstinence), not what they did ‘wrong’ (e.g. not making recommended lifestyle changes).	1.1	4.4	18.2	51.9	24.3
15	Incentives can be useful whether or not they address the underlying reasons for engaging in unhealthy behaviour.	3.9	17.7	30.9	38.1	9.4
16	Incentives can be useful in building healthy behaviours (e.g. physical exercise, healthy eating).	0.6	5.0	12.7	58.0	23.8
17	Incentives can be useful in reducing unhealthy behaviours (e.g. substance abuse).	1.1	13.3	12.7	53.6	19.3
18	Overall, I would be in favour of service user incentive programs.	2.2	6.1	11.0	44.8	35.9
<i>Negative beliefs</i>						
2	It is not right to give incentives to service users for what they should be doing in the first place.	19.3	37.6	23.2	16.6	3.3
4	Incentives will stop the service user from realising their internal motivation to engage in healthy behaviours.	10.5	34.3	27.6	21.5	6.1
6	It is not useful to give service users incentives because positive behaviour change will last only as long as the incentives are given.	11.6	37.0	29.3	17.7	4.4
7	Giving incentives on a consistent and ongoing basis conflicts with my idea of appropriate treatment.	13.3	34.8	26.0	21.5	4.4
8	Incentives are offensive to me because they are a bribe.	29.8	43.1	16.0	8.3	2.8
9	There are enough rewards in being healthy; incentives are not necessary.	14.4	39.8	22.7	17.7	5.5
13	Most service users would sell or exchange incentives (e.g. shop vouchers) they receive for cash, and then use the money to engage in substance use.	10.5	23.8	34.3	23.8	7.7
14	Incentives are most useful for short-term purposes (e.g. encouraging smoking cessation for several weeks prior to surgery; increasing appropriate use of antibiotics).	5.5	17.1	39.2	32.0	6.1

Acceptability of tangible and social incentives. Service vouchers (e.g. gym passes) were rated as most acceptable (84%), followed by retail vouchers (74%), social

incentives (71%), prize draws (62%) and clinical privileges (55%). Cash incentives were least acceptable (33%).

Table 3. Percentage of participants agreeing with additional survey items. Arranged in order of acceptability

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
<i>Acceptable rewards</i>					
Service vouchers (e.g. gym pass, travel card)	1.7	3.3	11.0	45.3	38.7
Retail vouchers (e.g. supermarket vouchers)	3.9	7.7	14.4	42.5	31.5
Social incentives (e.g. praise, certificates)	2.2	7.2	19.3	40.3	30.9
Prize draw entry (i.e. chance to win a prize)	6.1	8.3	23.2	36.5	26.0
Clinical privileges (e.g. take-home methadone doses)	11.0	11.6	22.1	34.3	21.0
Cash	30.4	21.0	16.0	22.7	9.9
<i>Acceptable target behaviours</i>					
Attendance at the clinic	3.3	5.0	17.1	49.7	24.9
Alcohol use	5.0	5.0	18.8	46.4	24.9
Adherence to prescribed medications	3.9	6.1	21.5	46.4	22.1
Stimulant use (e.g. cocaine, amphetamines)	5.5	7.2	21.0	45.9	20.4
Nicotine use	7.2	6.6	20.4	44.2	21.5
Non-prescribed opiate use (e.g. heroin, codeine, morphine)	5.0	7.2	22.2	42.2	23.3
Cannabis use	5.0	5.5	27.6	44.2	17.7
<i>Acceptable monitoring devices</i>					
Breathalyser to verify reduced alcohol consumption	1.7	4.4	10.0	58.3	25.6
Breath carbon monoxide to verify smoking cessation	2.8	6.1	13.3	53.6	24.3
Electronic device (i.e. tablet, computer, mobile phone) to record attendance at the clinic	2.8	7.2	12.2	55.2	22.7
Electronic pill dispenser to verify medication consumption	2.8	6.6	16.6	53.0	21.0
<i>Acceptable delivery of social reinforcement</i>					
In person	1.1	2.2	5.0	38.1	53.6
By phone call	3.3	5.5	14.4	44.2	32.6
By text message	5.5	9.9	11.6	42.0	30.9
<i>Acceptable delivery of tangible reinforcement</i>					
In person	4.4	3.9	12.2	42.0	37.6
On a reloadable debit card (provided by the clinic)	7.2	9.9	21.0	39.2	22.7
In the post	7.7	16.6	24.9	32.6	18.2

Acceptability of target behaviours. Most participants responded that it was acceptable for CM to target non-substance use behaviours such as attendance (75%) and adherence to medications (69%). Levels of acceptability towards CM targeting substance use varied depending on substance, from 62% for cannabis use to 71% for alcohol use. While less than 14% deemed targeting any substance unacceptable, 22% of participants indicated neutral responses, suggesting a level of uncertainty.

Acceptability of different modes of delivery. The results indicate significantly high levels of acceptability (78%) towards the use of electronic devices to monitor behaviour. As many as 81% and 74% thought it appropriate to monitor a reduction or cessation of substances using a breathalyser or medication compliance using an electronic pill dispenser. Although the majority deemed it more acceptable to receive social (92%) and tangible (80%) incentives in person, remote delivery via phone

call (77%), text message (73%) or reloadable debit card (62%) were also acceptable. In contrast, delivery of tangible incentives in the post was acceptable to only a bare majority (51%).

Associations between participant characteristics and beliefs regarding CM

No association was found between awareness or experience of CM, age or length of time in treatment and positive or negative beliefs (Table 4).

Discussion

Our study found that 81% of patients in treatment for SUD in UK addiction services are in favour of CM interventions. Our findings suggest that patients

Table 4. Chi-squared associations between positive and negative beliefs towards CM and participant characteristics

	Positive beliefs towards CM			Negative beliefs towards CM		
	Agree, n (%)	Disagree, n (%)	Chi-square	Agree, n (%)	Disagree, n (%)	Chi-square
<i>Awareness of CM</i>						
Yes	57 (97%)	2 (3%)	$\chi^2(1) = 0.002, P = 0.969$	35 (59%)	24 (41%)	$\chi^2(1) = 0.002, P = 0.969$
No	118 (97%)	4 (3%)		79 (59%)	50 (41%)	
<i>Experience of CM</i>						
Yes	14 (100%)	0 (0%)	$\chi^2(1) = 0.520, P = 0.471$	12 (86%)	2 (14%)	$\chi^2(1) = 4.42, P = 0.035^a$
No	161 (96%)	6 (4%)		95 (57%)	72 (43%)	
<i>Age, years</i>						
20–30	19 (95%)	1 (5%)	$\chi^2(4) = 7.476, P = 0.113$	11 (55%)	9 (45%)	$\chi^2(4) = 6.118, P = 0.191$
30–40	43 (98%)	1 (2%)		30 (68%)	14 (32%)	
40–50	57 (97%)	2 (3%)		35 (59%)	28 (41%)	
50–60	41 (100%)	0 (0%)		19 (46%)	22 (54%)	
60–74	11 (85%)	2 (15%)		10 (77%)	3 (23%)	
<i>Length of time in treatment</i>						
<1 year	53 (95%)	3 (5%)	$\chi^2(3) = 1.191, P = 0.755$	38 (68%)	18 (32%)	$\chi^2(3) = 4.706, P = 0.195$
1–5 years	43 (98%)	1 (2%)		26 (59%)	18 (41%)	
5–10 years	27 (96%)	1 (4%)		18 (64%)	10 (36%)	
10+ years	51 (98%)	1 (2%)		25 (48%)	27 (52%)	

^aThere was some evidence that people with experience of contingency management differed from those with no experience of contingency management in terms of their negative beliefs in Chi-square analyses, although not in logistic regression and confidence intervals indicated low precision (odds ratio 4.547, 95% confidence interval 0.987–20.958). CM, contingency management.

believe CM could be useful in building healthy behaviours (e.g. attendance) and reducing unhealthy behaviours (e.g. substance use). Although limited research has been conducted to examine patients' beliefs towards CM, our findings are consistent with those examining acceptability towards study procedures among patients in receipt of CM [15–18].

Among objections commonly held by treatment providers is that it is unethical to 'pay people for what they should be doing anyway' [14], however we found little support for this concern among participants. While half of our participants agreed 'incentives can be useful whether or not they address the underlying reasons for engaging in unhealthy behaviours', a modest proportion agreed that 'incentives will stop the service user from realising their internal motivation to engage in healthy behaviours'. This was one of the biggest concerns among our sample and one that might pose significant barriers to the uptake of CM among patients.

Health-care providers also report concern about the impact CM may have on the therapeutic relationship [15]. Although some suggest CM can strengthen this relationship others argue that it could negatively impact the development and sustainability of it, by shifting the focus from the treatment needs of the individual to monitoring behaviours and delivery of monetary reward [34]. While we found some uncertainty reflected by around a quarter offering a 'neutral'

response, 65% agreed that 'incentives are good for the service user-recovery worker relationship'. Future investigations must explore this critical issue and carefully consider the way in which incentives are provided to participants and by whom.

Our study allowed us to explore patients' acceptance of the use of tangible and social incentives. This insight is key in the development of CM interventions to ensure the reward is appropriate and meaningful. While retail and service vouchers were acceptable to most, 51% of participants disagreed with the use of cash. Previous research suggests that cash may be more effective than voucher-based reinforcers and participants utilise their incentives responsibly [35,36]. Therefore, it is essential that objections towards the use of cash incentives are addressed effectively. However, it is possible that presenting a range of tangible and social incentives concurrently created a contrast effect. While a similar effect was found in the original study utilising the PSI tool [8], and this was considered in the development of the SUSI, future research should do more to minimise this impact.

Furthermore, moderate levels of support were found for targeting abstinence, with alcohol use being most endorsed. Worth noting however, is that around one in five patients indicated neutral responses (22%), suggesting some level of uncertainty. It is plausible to assume that patients demonstrating negligible

acceptability towards CM are more likely to report less support to targeting behaviour change. Despite this ambiguity, a small number of patients indicated that targeting any substance would be unacceptable. Conversely, encouraging non-substance use behaviours were reported to be more acceptable, with more than two thirds of participants deeming it appropriate. This is important, as CM targeting these behaviours can have a positive impact on reducing substance use [37,38].

The empirical findings from this study are the first to shed light on patients' attitudes towards the use of technological devices including mobile telephones to deliver CM. The findings allow us to understand how patients perceive remote applications of CM and their acceptability towards these modalities which are typically automated with limited human interaction. Our findings suggest that patients consider it acceptable to use devices such as breathalysers to monitor treatment behaviours or verify a reduction in substance use. Modest levels of acceptability towards the use of technology (e.g. mobile telephones) to monitor behaviour and deliver reinforcement were also found. These findings are pertinent in the development of remote CM interventions, as they suggest patients' recognition of the importance to ensure objective measurement and verification of the target behaviour. With mobile telephone-delivered CM demonstrating potential effectiveness in encouraging abstinence and 96% of patients currently owning a mobile telephone, using this platform to extend the reach of CM within a UK setting may be more possible than ever before.

Study strengths

This study not only provides novel insight into the beliefs and objections held by patients towards CM, but sheds light on patients' acceptance of the use of remote technological devices to monitor behaviour and deliver reinforcement. Assessing perceived beliefs and objections towards technology-based CM among non-recipients provides an important perspective and eliminates biases associated with conducting acceptability assessments with individuals already enrolled and engaging with a CM intervention. Furthermore, the SUSI tool was developed in collaboration with the PSI author, selecting items based on their relevance to a patient population and modifying the language to ensure appropriate for a UK audience. As the original PSI consisting of 44 items was deemed too lengthy and cumbersome for our target group making it difficult to implement, the SUSI consisted of 18 items. The SUSI tool demonstrated high levels of internal consistency and reliability, warranting its use and

application for future studies examining beliefs held regarding CM interventions.

Study limitations

Despite successfully capturing a range of patients receiving treatment for drugs and alcohol, our sample cannot be representative of all UK patients receiving substance use treatment and thus caution should be taken when interpreting findings. Furthermore, the samples were those currently in treatment for SUD, indicating some degree of engagement with their treatment. Future explorations should examine beliefs held among individuals outside of London and those not in treatment for SUD who might offer a different perspective.

Our findings also indicate a high proportion of participants selected a 'neutral' response to negative belief statements, indicating frequent ambiguity. The interpretation of neutral responses presents considerable challenges as one might select a neutral response when they believe the question is not relevant to them or they do not feel they have enough information to make an informed choice. Another plausible explanation could be difficulty in understanding the terminology used in the SUSI tool. Although this would not have disadvantaged the majority, patient consultations in the development phase could have helped ensure the SUSI tool was suitable for a range of educational abilities. Furthermore, previous literature has highlighted the impact limited understanding of CM has on beliefs and objections among treatment providers [21]. Although our study found no evidence to support the association between beliefs and experience with CM, the number of participants with prior experience might have been too small for differences to be detected. Further investigations with larger samples sizes would enable us to explore how beliefs might differ by demographic group. Additionally, it was not possible to assess associations between substance receiving treatment for and levels of acceptability towards CM, however future research should consider this, given that treatment outcomes differ by type of substance.

Conclusion

This study is the first to assess patients' beliefs towards CM and the acceptability of delivering these interventions remotely using technology among patients in treatment for SUD. These findings not only highlight the most prevalent objections and concerns that may impact upon uptake of CM, but also indicate that most patients are accepting of these interventions. However, future research must address several key issues

highlighted by this study. Addressing objections towards the use of cash incentives is imperative in ensuring these interventions are acceptable to the patient population. Future surveys should consider the addition of open-ended qualitative questions to enable participants to indicate their reasoning and motivations for their particular beliefs and objections towards CM. Furthermore, future research should utilise larger sample size to examine beliefs held among other patient groups, including those not in treatment for SUD; patients outside of London; and those with prior experience of CM interventions. Despite no association being found between experience of CM and beliefs held about these interventions, previous literature has indicated the role awareness and experience of CM plays in generating positive attitudes towards these interventions and therefore efforts should be made to promote understanding of these treatments and the integration of such in UK clinical practice. Finally, remote CM and mobile CM specifically, may offer a potentially useful means of engaging those individuals who are particularly difficult to treat due to comorbidity and polysubstance use, and therefore their development and implementation within UK drug treatment services should be given serious consideration.

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Conflict of Interest

The authors have no conflicts of interest.

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