

# BMJ Open Piloting the addition of contingency management to best practice counselling as an adjunct treatment for rural and remote disordered gamblers: study protocol

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## ABSTRACT

**Introduction** Problematic gambling is a significant Canadian public health concern that causes harm to the gambler, their families, and society. However, a significant minority of gambling treatment seekers drop out prior to the issue being resolved; those with higher impulsivity scores have the highest drop-out rates. Consequently, retention is a major concern for treatment providers. The aim of this study is to investigate the efficacy of internet-delivered cognitive behavioural therapy (CBT) and internet-delivered CBT and contingency management (CM+) as treatments for gambling disorder in rural Albertan populations. Contingency management (CM) is a successful treatment approach for substance dependence that uses small incentives to reinforce abstinence. This approach may be suitable for the treatment of gambling disorder. Furthermore, internet-delivered CM may hold particular promise in rural contexts, as these communities typically struggle to access traditional clinic-based counselling opportunities.

**Methods and analysis** 54 adults with gambling disorder will be randomised into one of two conditions: CM and CBT (CM+) or CBT alone (CBT). Gambling will be assessed at intake, every treatment session, post-treatment, and follow-up. The primary outcome measures are treatment attendance, gambling abstinence, gambling, gambling symptomatology, and gambling urge. In addition, qualitative interviews assessing study experiences will be conducted with the supervising counsellor, graduate student counsellors, study affiliates, and a subset of treatment seekers. This is the first study to use CM as a treatment for gambling disorder in rural and remote populations.

**Ethics and dissemination** This study was approved by the University of Lethbridge's Human Subject Research Committee (#2016–080). The investigators plan to publish the results from this study in academic peer-reviewed journals. Summary information will be provided to the funder.

**Trial registration number** NCT02953899; Pre-results.

## INTRODUCTION

Problematic gambling is a significant Canadian public health concern that causes harm

## Strengths and limitations of this study

- First study to investigate the effect of providing counselling and contingency management for the treatment of gambling disorder in rural and remote populations.
- Internet delivery may provide a cost-efficient approach for delivery of counselling services.
- Contingency management is likely to improve treatment attendance and study retention.
- Sample size may be underpowered to detect changes in gambling behaviour and symptomatology in the cognitive behavioural therapy condition.
- Irregular internet availability in rural and remote regions may impede study accessibility.

to the gambler, their families, and society.<sup>1</sup> Approximately 4% of Albertans gamble in problematic ways resulting in significant financial losses, personal distress, broken relationships, and in some cases, suicide.<sup>2 3</sup> However, the numbers of Albertans seeking treatment for problem gambling appears to be declining, despite the relatively consistent problem gambling prevalence rates.<sup>2</sup> Furthermore, 33%–50% of gambling treatment seekers drop out from treatment prior to resolving the issue; those with higher impulsivity scores are more likely to drop out.<sup>4</sup> One possible reason for these issues is the lack of immediate benefits clients gain from treatment attendance.

Contingency management (CM) is a treatment approach that has superior retention and treatment efficacy compared with traditional approaches for substance and alcohol dependence.<sup>5</sup> CM uses motivational incentives, typically vouchers that are exchangeable for retail goods and services, to reward participants for providing evidence of the

target behaviour. Conversely, rewards are withheld when the participant fails to perform the target behaviour. CM has been successfully used in several countries in the treatment of various addictive substances.<sup>6,7</sup>

Meta-analyses have consistently found CM studies to report improved clinical outcomes and large treatment effect sizes.<sup>8,9</sup> Furthermore, CM studies typically report a greater likelihood of programme completion than standard care,<sup>10</sup> where the positive effects of CM persist many months after treatment completion.<sup>11</sup> Researchers are now suggesting that contingencies are important factors in the treatment of gambling<sup>12–14</sup> as the variable, but regular receipt of gambling wins are associated with the development of problematic gambling<sup>15</sup>. CM uses the same approach to reverse these associations.

The CM procedure has three basic components: (1) target behaviours are identified, (2) reinforcers (sometimes called motivational incentives or rewards) are provided when evidence for the target behaviours are produced, and (3) reinforcers are unavailable when a participant fails to perform the target behaviour.<sup>16</sup> Furthermore, CM treatment efficacy is improved by increasing the rate of reinforcers for continued performance of the target behaviour and resetting of the rate after a lapse,<sup>11</sup> delivering the reinforcer immediately after providing evidence of the target behaviour<sup>17</sup>, and increasing the magnitude of the reinforcer.<sup>18,19</sup>

The only published study of CM as a treatment of problematic gambling found significant reductions in gambling frequency, time spent gambling, money spent gambling, and net losses.<sup>12</sup> However, the target behaviours for reinforcement were participant selected goals, and typically these were non-abstinence related. Although this approach is congruent with CM approaches for the treatment of other behaviours,<sup>20</sup> the usual CM protocol is to select abstinence as the target behaviour.<sup>5</sup>

This study is based on the dosing schedule of pharmacological treatments for substance dependence where participants can attend three<sup>21</sup> or sometimes daily dosing sessions,<sup>22</sup> but instead of dosing, participants in this study can have up to three counselling or counselling and CM sessions. Although the above procedure requires significant participant commitment, it has important theoretical and practical advantages. For example, the theory of behavioural momentum suggests rates of behaviour are a function of reinforcement history,<sup>23</sup> where higher rates of reinforcement are related to greater persistence of the target behaviour despite disruptors.<sup>24</sup> Consequently, more opportunities to earn reinforcement will likely result in higher reinforcement rates and greater performance of the target behaviour (ie, abstinence from gambling). Moreover, as gambling and substance use are often comorbid,<sup>25</sup> with impulsivity the common link between the two,<sup>26</sup> we anticipate that some participants will show elevated impulsivity scores and have comorbid substance use. Consequently, we will not exclude participants with these issues unless these issues interfere with treatment.

We believe investigating the effects of internet-delivered treatments are particularly relevant for rural populations,<sup>27</sup> as these communities typically struggle to access counselling opportunities,<sup>28</sup> and the rates of problematic gambling are sometimes higher for rural persons than the Albertan average.<sup>2</sup> Furthermore, given that most telemedicine applications in Alberta are focused on delivering training or non-clinical services,<sup>28</sup> and that the government of Alberta may legalise on-line gambling in the near future, gambling harm and treatment need are likely to increase for rural and remote Albertans.<sup>29</sup> Also, as gambling and the internet are ubiquitous phenomena in western countries, this study may be relevant to other rural and remote jurisdictions. However, to our knowledge, no previous on-line CM treatment for problem gambling has been previously reported. This suggests the current study is likely to offer new insights and treatment opportunities to communities struggling to access gambling counselling services.

### AIM, HYPOTHESIS, OUTCOMES AND PREDICTIONS

The aim of this study is to investigate the effects of internet-delivered cognitive behavioural therapy (CBT) and internet-delivered CBT and CM (CM+) as treatments for gambling disorder in rural and remote Albertan populations. The hypothesis of this study is that people with gambling disorders struggle to remain in treatment and stay abstinent from gambling because, typically, the benefits of counselling only accrue over several sessions while, with gambling, there is always the immediate possibility of winning which is oftentimes more attractive than non-gambling to those with gambling problems. The primary outcome measures are treatment attendance, and evidence of gambling abstinence, gambling, gambling symptomatology, and gambling urge. We will also measure changes from pre-treatment to post-treatment for gambling losses, substance use, and impulsivity. Our predictions are: (1) the CM+ group will attend more treatment sessions than the CBT group, (2) the CM+ group will report a greater number of abstinent sessions than the CBT group, (3) and that gambling abstinence is related to gambling urge, impulsivity, and substance use.

### METHODOLOGY

#### Design

The chosen design is a randomised clinical trial (pre-post), where participants are randomly allocated by a computer algorithm into one of two conditions: CM+ or CBT alone for the treatment of gambling disorder. Allocation is made after the consent process. Dr Christensen will administer the allocation process. Counselling will be provided free using Skype or Facetime video-conferencing internet applications. Participation in each condition will last 14 weeks: 12 weeks for treatment and 2 weeks of assessments (1 week prior to treatment and 1 week post-treatment).

Pre-treatment assessments (including demographic information) will take approximately 30–45 min, as will the post-treatment assessments. The progress check-ups by the principal investigator will take 5–10 min. These check-ups will be conducted in the fourth week of counselling. A subset of treatment seekers, counsellors and community/project stakeholders will also be chosen to participate in qualitative interviews to explore their experiences as well as their perceptions regarding the utility of the programme for Albertans living in rural and remote areas. The qualitative interviews will take approximately 30–60 min.

### Study setting

The project will be run from the research offices of Dr Christensen in the Faculty of Health Sciences at the University of Lethbridge. Participants can access the counselling from any location within the Canadian Research Initiative in Substance Misuse (CRISM): Prairie Node network (a network of drug use researchers, service providers, policy makers, and people with lived experience from the Canadian provinces of Alberta, Saskatchewan, and Manitoba) or from their own computer. The purpose of the CRISM network is to facilitate collaboration between interested groups and to promote evidence-based practices. Qualitative interviews will take place either in person at a mutually agreed private location or by telephone.

### Partner

We have partnered with the Alberta Rural Development Network (ARDN) to recruit potential participants. The ARDN is a non-government organisation that works with postsecondary institutions to improve the lives of rural and remote Albertans. The ARDN uses a strengths-based approach where the strengths of rural communities, postsecondary institutions, and community-based organisations are used to develop rural Alberta through education, research, collaboration, and networking. The ARDN is involved with the creation of community-driven projects, facilitates the creation of new partnerships, shares applied research and information, and works with rural communities to identify and address gaps in knowledge, service delivery, education, and training. The ARDN will also distribute our recruitment materials to their affiliate organisations.

### Subjects

The study will recruit 54 treatment-seeking participants to achieve 44 (approximately 20% drop out, similar to a recent CM study<sup>21</sup>) treatment-seeking disordered gamblers (n=22 per group). At study completion, we will also recruit a subset of treatment seekers, counsellors, and ARDN affiliates for qualitative interviews.

### Sample size

As this is a pilot study, it has fewer participants than a fully powered study. However, based on similar studies we *cautiously* estimate that the CM+ treatment is sufficiently powered to observe significant treatment group

effects based on the difference of two dependent means, from baseline to treatment completion (ie,  $d=1.02$ ,  $n=22$ ,  $\alpha=0.05$ , where estimated power=99%), however the CBT-alone group is likely to be underpowered to observe a significant difference from baseline to treatment completion (ie,  $d=0.28$ ,  $\alpha=0.05$ ,  $n=22$ , where estimated power=35%).<sup>8</sup> Furthermore, generic and moderately powered analyses of variance with repeated measures and a within-between interaction are estimated to slightly increase the power to observe a significant difference in treatment effects between groups (ie,  $f=0.25$ ,  $\alpha=0.05$ , groups=2, power=0.90, number of measurements=12, where estimated power=92%).

### Procedure

#### Recruitment

Participant recruitment is facilitated by the ARDN whose projects deal with thousands of homeless and at-risk people annually. The ARDN will email Family and Community Support Services offices and rural community-based organisations the study flyer. The ARDN will distribute study advertising material, but will not refer any individuals to the study. A brief description of the study will also be posted on-line on the University of Lethbridge's website. Treatment-seeking participants will contact Dr Christensen by email or telephone to set-up a screening interview. Screening will be conducted by a telephone or video-conferencing interview. Consent and the remaining intake questions are completed on-line using a Qualtrics survey. We will continue to recruit until we have achieved the desired study enrolment number. Dr Witcher will contact the treatment seekers, counsellors, and ARDN affiliates to setup the qualitative interviews.

#### Eligibility

Treatment-seeking participants must meet all of the following criteria: 18–70 years of age, capable of providing written consent and endorse four or more Diagnostic and Statistical Manual for Mental Disorders-V (DSM-V) gambling disorder criteria<sup>30 31</sup>, gambled within the last month, live in a rural or remote location, and speak English. Based on a screening interview between the investigator and potential participant, evidence of the following will exclude participation: medically unmanaged psychiatric or neurological disorder(s) likely to interfere with treatment. Participants with comorbid substance use will not be excluded. Clients of the ARDN who are deemed at-risk of homelessness (ie, financial stress, housing affordability issues, unsafe or problematic relationships, employment difficulties, etc) or who are homeless will be purposively given the study advertising materials by ARDN affiliates. No coercion, implied or suggested will take place, and non-participation will likely not affect access to ARDN services. Inclusion and exclusion criteria for treatment seekers will be determined by our screening procedures. The eligibility criteria for counsellors is that they must have counselled a treatment seeker from treatment start to completion. The

eligibility criteria for the ARDN affiliates is that they must have participated in the study.

### Group allocation

Eligible participants will be randomly allocated by a computer algorithm prior to study commencement into two groups with equal numbers of participants. There is no participant or counsellor blinding as counsellors inform the CM+ group of their session earnings at each session while the counsellors will inform the CBT group that they will not receive study credit for session attendance or evidence of abstinence.

### Contingency management

This is a treatment where participants earn study credit for treatment attendance and for providing evidence of gambling abstinence. Abstinence is defined as either financial evidence (cash withdrawals can be satisfactorily explained) or the corroboration by the significant other than the participant has not gambled since the previous session. Study credit is added to study accounts that can be redeemed for goods and services available at a variety of on-line businesses (eg, Amazon, Walmart, etc). Alternatively, treatment-seeking participants can request gift cards from local businesses. Attendance at Skype/Facetime counselling sessions earns 5 points each worth \$C0.10, providing evidence of abstinence (eg, bank statements where cash withdrawals can be explained to the satisfaction of the counsellor) earns 10 points each worth \$C0.20, while corroboration by significant others earns 5 points each worth \$C0.10. Subsequent consecutive online attendance and providing evidence of abstinence increases the value of these outcomes by 1 point, where an additional \$C10.00 of study credit is available for each set of three non-overlapping consecutive weeks of attendance. Participants also receive a study completion bonus of \$C50 study credit. Submission of evidence of gambling behaviour or non-attendance at an on-line counselling session resets subsequent points to the starting level. Submission of abstinence evidence in three consecutive sessions will return the value of subsequent points to the earnings rate before the reset. Points, once earned, cannot be lost. The maximum possible amount that can be earned over the 12-week programme is \$C450 in study credit. These rates of payments, bonuses and design are similar to CM substance dependence treatment studies.<sup>21</sup> The CM procedure is implemented as part of each CBT counselling session for approximately 10min at the start of the session where the counsellors explicitly state 'do you have any evidence for gambling abstinence today'. Counsellors maintain the tally of study credit and this is shared on secure servers or password protected email with the primary investigator. Study credit is available immediately after verification from the counsellor. The CM component ends and the CBT session starts when the counsellor states to the client "Now, let us begin with our session". The primary investigator contacts participants who have dropped out to arrange for payment of any outstanding

study credit. Payments are made by gift cards or personal cheque (if <\$C10). The counsellors and participant negotiate the counselling schedule.

### Cognitive behavioural therapy

CBT is currently considered 'best practice' for the treatment of problem gambling, as noted in the National Health and Medical Research Council's (Australia) endorsed Clinical Guidelines for problem and pathological gambling treatment.<sup>32</sup> CBT is typically a semi-structured approach addressing the participant's experiences, thoughts, and emotions relating to their gambling.<sup>33</sup> Counsellors begin by assessing the client's problematic gambling within the context of other presenting issues, life circumstances, and individual and systemic factors.<sup>34</sup> Treatment plans are developed with consideration for each individual's history and needs and rely on the establishment of a collaborative therapeutic working alliance.<sup>35</sup> CBT may involve a variety of specific techniques or interventions tailored to each client's specific presentation, with a focus on understanding patterns involved in gambling behaviour. Techniques include psychoeducation, behavioural interventions, and cognitive strategies. Psychoeducation about the aetiology of problem gambling may form an important aspect of this therapy as clients are encouraged to identify patterns in their gambling behaviours, including antecedents to gambling such as certain events, mood states, or thoughts.<sup>36</sup> Developing positive coping strategies, including self-regulation or stress management and mindfulness-based techniques are examples of behavioural interventions. For example, clients can identify an anxious feeling that leads them to want to gamble, and can practice a mindful breathing technique to decrease anxiety.<sup>34</sup> Cognitive strategies include identifying and distinguishing between thoughts and emotions, and reframing habitual thought distortions that are involved in patterns of gambling.<sup>35</sup> For example, thoughts such as "I will only spend twenty dollars" can be analysed through a thought log, and replaced with more realistic thoughts. Participants can attend three on-line counselling sessions per week for approximately 12 weeks. However, based on a similar terrestrial CM study, participants will most likely attend only one session per week. All participants will receive individual counselling from an experienced counsellor/therapist.

### Counsellor safety measures

Counsellors will regularly check-in with the primary investigator and also with each other across the course of the study. Significant issues will be brought to the attention of the University of Lethbridge's Human Subject Research Committee. Furthermore, graduate student counsellors will receive biweekly clinical supervision from Dr Leighton where they will discuss participants' progress and study issues. In general, the graduate student counsellors have either experience in the area and/or have graduated from the University of Lethbridge's undergraduate Addictions Counselling programme (or equivalent). The

student counsellors are also overseen by their practicum supervisor, who is a University colleague.

**Counsellor training**

All counsellors are trained in CBT by the University of Lethbridge’s Addiction Counselling programme or have previous CBT training/experiences. Furthermore, each counsellor is given a CBT text, the CBT checklist, and the study protocol and consent form to review prior to counselling. Finally, all counsellors are given instruction on the CM procedure by the primary investigator.

**Fidelity**

CM programme fidelity will be assessed by assessing supplied evidence of treatment attendance, financial statements, significant other reports, and inspection of CM spreadsheets and the CM calendar. CBT fidelity will be assessed based on audio-recordings of counselling sessions and assessing clinician responses for treatment type by an experienced clinician or counsellor/therapist who is not a member of the research team. A sample CBT session from each counsellor will be obtained. The CBT checklist was developed from the CBT text<sup>33</sup> that counsellors receive prior to their first session. Approximately 10% of participants will have one session assessed. The principal investigator will remove any identifying information from the audio-files before fidelity checks are made. The audio-recordings are not part of the research but part of our study adherence procedures.

**Measures**

Participants will be tested pre-treatment and post-treatment using a variety of demographic, clinical, psychological and behavioural measures. Please see [table 1](#) for when a measure is administered.

**DSM-V gambling disorder criteria**

This is a series of nine gambling disorder criteria from the DSM-V.<sup>31</sup> It specifies gambling disorder severity into

three categories: mild, moderate and severe, and if appropriate, the type of remission and temporal clustering of criteria endorsement. A recent archival analysis found the majority of DSM-V gambling disorder assessments to have excellent reliability and moderate-to-high validity scores.<sup>36</sup>

**Barrat Impulsivity Scale**

Barratt and colleagues developed this test to measure an impulsivity construct that is orthogonal to anxiety but related to similar personality traits, such as extraversion and sensation seeking.<sup>37</sup> The Barrat Impulsivity Scale (BIS)-11 is made up of three subscales: attentional impulsiveness (eg, "I get easily bored when solving thought problems"), motor impulsiveness (eg, "I do things without thinking"), and non-planning impulsiveness (eg, "I am more interested in the present than the future"). Patton *et al*<sup>37</sup> reported good internal consistency scores for the BIS-11 total score (0.79–0.83) in clinical and non-clinical populations.

**Gambling Urges Scale**

Raylu *et al* adapted an alcohol-related urge scale to assess gambling urges with the intent to provide a quick screening tool.<sup>38</sup> They created a 6-item Gambling Urge Questionnaire and analysed the responses from 968 community-based participants. A factor analysis using half of the sample indicated a 1-factor solution that accounted for 55.18% of the total variance. This was confirmed using a confirmatory factor analysis with the other half of the sample. Reports of concurrent, predictive and criterion-related validity of the Gambling Urges Scale (GUS) suggest that the GUS is a valid and reliable instrument for assessing gambling urges.<sup>38</sup>

**Delay discounting**

This task assesses participant’s ‘impulsive’ versus ‘far-sighted’ behavioural strategies.<sup>39</sup> Participants are

**Table 1** Assessment schedule

Item	Screening	Assessment: on-line survey	Week												Trial end	
			1	2	3	5	6	7	8	9	10	11	12			
Consent		✓														
Demographics	✓	✓														
DSM-V	✓															
BIS		✓														✓
GUS		✓														✓
DD		✓														✓
G-SAS		✓														✓
ASSIST		✓														✓
Gambling	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

ASSIST, The Alcohol, Smoking and Substance Involvement Screening Test; BIS, Barrat Impulsivity Scale; DD, Delay Discounting; DSM-V, Diagnostic and Statistical Manual for Mental Disorders-V Gambling Disorder; G-SAS, Gambling Symptom Assessment Scale; Gambling, Evidence of gambling behaviour; GUS, Gambling Urges Scale.

presented with a series of hypothetical scenarios in which they determine the relative value of a delayed ‘reward’ (eg, delayed money) to an immediate ‘reward’ using different delays (eg, 1 day to 25 years) and magnitudes (eg, \$C31, \$C85). For example, a participant may be asked to choose between hypothetical alternatives such as \$C55 in 7 days’ time and \$C20 immediately. The discounting rate of delayed outcomes is obtained.

#### The Alcohol, Smoking and Substance Involvement Screening Test

The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) was recently developed for the WHO by an international group of substance abuse researchers to screen for problem or risky use of tobacco, alcohol, cannabis, cocaine, amphetamine-type stimulants, sedatives, hallucinogens, inhalants, opioids, and ‘other drugs’ that do not fall into the previous nine categories.<sup>40</sup> The ASSIST was found to have high internal consistency ( $\alpha > 0.80$ ), correlated well against similarly worded items of other questionnaires, and good concurrent validity with a range of substance use and dependence measures.<sup>40</sup>

#### Gambling Symptom Assessment Scale

This is a 12-item self-rated Likert scale (0–4) designed to assess the change of gambling symptoms during treatment. It detects changes in gambling and urges, thoughts and preoccupation, control, emotional distress, and adverse personal consequences as a result of gambling in the last 7 days.<sup>41</sup> The scale has good test-retest reliability ( $n=58$ ;  $r=0.70$ ), and item consistency ( $\alpha=0.89$ ), while convergent validity compared favourably with another gambling index over a 10-week period ( $n=48$ ;  $r$  scores = 0.68–0.82).<sup>41</sup>

#### Gambling

At each session, counsellors will report session attendance, evidence of abstinence, and corroboration by significant others of gambling abstinence. The counsellor will also record participant self-reports of net gambling losses, time spent gambling, and frequency of gambling sessions.

#### Compensation

All treatment-seeking participants will receive a \$C25 study credit for completing pre-treatment measures and an additional \$C50 study credit for completing post-treatment measures. These monies are paid in physical gift cards or as on-line credit at on-line stores (they cannot be used as cash), and are in addition to the earnings received by the CM+ group. All unexpended study credit lower than the minimum gift card amount of \$C10 will be credited to participants into their nominated store account or a personal cheque will be posted to them. Alternatively, treatment-seeking participants can request gift cards from local businesses. Treatment-seeking participants can indicate their preference on the consent form. Counsellors and ARDN affiliates will not receive compensation for answering the study evaluation questions. Treatment seekers who participate in the qualitative evaluation

component will receive a nominal payment of a \$C10 gift card.

#### Data management

Participant, counsellor, and affiliate information will be held in secure locked cabinets or on password-protected computers. The counselling location is Dr Christensen’s research room (Markin Hall 4132, University of Lethbridge), while the screening is conducted in Dr Christensen’s office (3011 Markin Hall, University of Lethbridge). The counselling is conducted on-line using free video-conferencing applications. Participants are informed of the study risks, including data interception, and the procedures we use to mitigate these risks, in the consent form. All identifiable data will be retained for 5 years and then shredded or deleted. Non-identifiable data will be kept by the principal investigator. Only the research team will have access to the data. Data monitoring will be the responsibility of the investigators.

#### ETHICS AND DISSEMINATION

Treatment-seeking participants will respond to study advertisements distributed by the Alberta Development Network, advertisements in rural media, and study information included in self-exclusion packages and from gamesense information booths in rural casinos. Treatment-seeking participants contact Dr Christensen for a screening interview. The study is explained by Dr. Christensen during the consent process which occurs immediately after screening (or when the participant is available). Treatment-seeking participants are informed of their right to withdraw from the study throughout the consent process and this right is stated in the consent form. Treatment-seeking participants who wish to withdraw from the study will have their information destroyed except for their eligibility criteria and pre-treatment scores. This caveat is described in the consent form. If treatment-seeking participants express an interest in the study they are then directed to the Qualtrics site where they complete the consent form on-line before the pre-treatment measures are available. Treatment-seeking participants will type their name stating they consent to participate in the study. Treatment-seeking participants are then contacted by email to set-up their first counselling session. Treatment-seeking participants are randomly assigned to the CM+ or CBT group after consent. We report the random assignment of treatment-seeking participants in the consent form and in the consent process to fully disclose our procedures to potential participants. All treatment-seeking participants receive free counselling and are compensated for completing the study assessments. Counsellors who notice distress in treatment seekers will stop counselling and seek to provide help or arrange alternative help options for the participant.

A subset of treatment seekers, counsellors, and ARDN affiliates will be contacted by Dr Witcher to participate

in qualitative interviews. Dr Witcher will conduct the qualitative interviews. Treatment seekers who consent to the main study will also be asked to consent to follow-up procedures including a qualitative interview. Only treatment seekers that indicate their consent for the qualitative interview will be contacted. Dr Witcher will contact the counsellors and ask if they are willing to participate in an interview to discuss their experiences as counsellors in the study. ARDN Executive Director Dee Ann Benard will provide a list of ARDN affiliates to Dr Witcher who will then contact the affiliates to see if they are willing to participate in an interview to discuss their experiences as affiliates in the study. Dr Witcher will obtain written consent from the counsellors and ARDN affiliates before the interview. For the telephone interviews, Dr Witcher will post a self-addressed envelope containing the consent form and wait for the return of a signed consent form before interviewing the participant. The investigators will provide annual reports to the University of Lethbridge's Human Subject Research Committee and report any adverse events to this committee. Amendments will be submitted to this committee.

Participant anonymity will be partially protected as the study team members will have access to the participants' identities. Participant identities will only be shared to outside groups when the participant consents to release their identity to non-Alberta Health Service (AHS) providers. No release of information will be requested from AHS. The clinician/therapist scoring treatment fidelity will be provided with a redacted audio-recording of the CBT component of the treatment sessions. The principal investigator will digitally redact the audio-recorded sessions using Audacity (a free audio editor). Papers emanating from this study will only report aggregate data so no individual can be identified from this information. Referrals will consist of providing the participant with the contact information of services appropriate for their needs. Furthermore, as the consent information and assessment data are held on secure Qualtrics servers and the counselling is delivered on internet applications, it is unlikely that this information will be intercepted or accessed. This issue is explained in the treatment-seeking participant consent form.

Participant information will be held in locked rooms and cabinets that only the study team has access to (ie, Markin Hall rooms M4132 and M3011) and on password-protected computers in those rooms. Only the investigators will have access to this data except when a participant consents to release information to non-AHS health service providers. The information that may be released are study participation, the purpose of the study, nature of study participation, and participant progress. The release of information process will be explained in the consent process and is stated in the consent form. Consent and assessment data will be held on the secure Qualtrics website and this is explained in the consent process and is stated in the consent form. All data will be retained for 5 years and then shredded or deleted.

All investigators will have the final de-identified dataset. Sharing of the de-identified data set requires consent from all investigators. No investigators will share the identifiable dataset.

No information that identifies a participant will be released into the public domain. Participants have the right to review their information at any stage of the study. They can also withdraw from the study at any stage but their treatment-seeker eligibility and intake data will be retained in the dataset. These caveats are included in the consent form.

All participants can request a lay summary of the results by contacting the principal investigator. His contact information is in the consent form. Treatment-seeking participants will be sent an electronically signed copy of the consent form. In addition, treatment-seeking participants will have access to a generic study consent form for the duration of the study on the study website. Treatment-seeking participants can also contact the primary researcher for a copy of the consent form. Counsellors and ARDN affiliates who participated in the qualitative interviews will receive a copy of the signed consent form. The investigators intend to publish from the de-identified dataset in peer-reviewed academic journals. The investigators will also present summary information to the funder.

At treatment completion, participants will be referred to the free AHS helpline where they can receive counselling and psychoeducation services from local provincial government run counselling services. Data on participant attendance in post-treatment services will be systematically collected at follow-up.

### Statistical analysis

Participants will be primarily compared on study attendance and retention measures and gambling behaviour (predictions one and two) using parametric analyses (ie, t-tests), we will also analyse abstinence using repeated measures, descriptive scores of participant demographics, and where appropriate, non-parametric tests (eg, survival plots for study retention). Additionally, comorbid variables will be treated as covariates in subsequent covariance analyses (prediction three). We will also test whether there is a relationship between abstinence and study retention, and abstinence and session attendance. Furthermore, clinical outcomes will be analysed based on counsellor type: graduate student or faculty member. Although we anticipate no missing data, where necessary, we will use data appropriate imputation methods (ie, median values for quantitative scores). When participants fail to attend a scheduled session this is evidence of a break in their continuous treatment sessions, and when they fail to produce evidence of gambling abstinence this is evidence of gambling behaviour.

### Qualitative analysis

Regarding the qualitative data obtained, thematic analysis procedures will be used to generate themes with respect to perceptions of success and perceived constraints or

challenges from study participants, counsellors and stakeholders.

### Study evaluation

A unique aspect of the study is its focus on Albertans residing in rural and remote areas. To properly situate our findings in terms of other contingency management and internet-delivered treatment studies, and potentially inform other studies in rural and/or remote areas, we will conduct a mixed methods feasibility assessment. For example, quantitative data will be obtained with respect to recruitment and participation rates (analysed by location, demographics and comorbidity variables), and rates of retention/programme completion. Furthermore, we will conduct a cost-benefit analysis investigating the relative benefits or costs per participant from this study. Our analyses will also describe the management and support systems necessary to implement this project in other agencies. Post-treatment, Dr Witcher will contact a subset of treatment-seeking participants, as well as counsellors, and ARDN affiliates regarding their perceptions of success and perceived constraints or challenges to treatment.

### DISCUSSION

This will be the first randomised controlled study examining the added impact of contingency management to CBT using internet-delivered counselling by videoconferencing for the treatment of gambling disorder. Furthermore, this study is also unique as it targets rural and remote Albertans. Contingency management appears well suited to the treatment of gambling disorder as gambling is maintained in part by the association between gambling and immediate reinforcement where CM competes with these associations by immediately reinforcing gambling abstinence, thereby reversing these associations.<sup>14</sup> However, this assertion needs further evidence for us to have confidence in these relationships.

Persons with gambling disorder typically experience shame and stigma.<sup>42</sup> Therefore, internet delivered treatments are likely to appeal to those who are hesitant about attending traditional counselling programmes,<sup>42</sup> and may alleviate participant concerns regarding community members noticing their attendance at counselling services. Furthermore, as our target group are rural and remote Albertans, participants need not travel to access counselling and health services that are typically located in urban settings, often at some distance to rural people. Similarly, the potential ease of accessibility for rural persons is also likely to improve participant attendance and retention in this study.<sup>43 44</sup>

Another important aspect of this study is the opportunity for participants to attend up to three sessions per week and receive reinforcement from the demonstration of more than one behaviour. By comparison, traditional gambling counselling typically only occurs once a week where treatment gains are sometimes slow to start and accumulate.<sup>45</sup> However, as this study

provides reinforcement from multiple sources, has a relatively intense reinforcement schedule and bonuses for sustained performance, it is designed to reinforce continuing and consecutive weeks of abstinence. This reinforcement schedule is congruent to another operant behavioural theory similar to contingency management: behavioural momentum. Behavioural momentum was developed from discriminant-operant relations where the rate of reinforcement and reinforcement histories influence response rates. The relationship between rate of reinforcement and behaviour is thought to be analogous to the second law of motion in Newtonian physics (ie, the velocity of an object in motion is proportional to the magnitude of the opposing force and opposite to the mass of the object<sup>24</sup>), where voluntary behaviour (ie, gambling abstinence) is analogous to 'velocity' and reinforcement history is similar to the 'mass' of an object.<sup>46</sup> Theoretically, as the rate of reinforcement increases so does the performance of the target behaviour: increasing the likelihood the target behaviour will be repeated and reducing the effects of the disrupter (ie, in this case the disrupter is the reinforcing effects from gambling). The assumption is, as the performance of sustained abstinence increases, so does the 'mass' for abstinence and the 'velocity' of future abstinence. Numerous studies show evidence of behavioural momentum when the target behaviour is sufficiently strong enough to successfully compete with the alternative.<sup>23</sup> Consequently, as participants can attend up to three times as many counselling sessions as treatment as usual, and can obtain reinforcements from multiple sources, this study is designed to generate greater behavioural 'mass' than traditional counselling, hopefully resulting in better attendance and retention and higher rates of abstinence at treatment completion and at post-treatment than the CBT-only group.

### Limitations

As previously noted, the study is powered to observe an effect for the CM+ group, but as previous meta-analyses report, the effect size for the CBT group is likely to show no significant effect. Furthermore, as treatment is delivered using the internet, if a participant cannot reliably access the internet this is likely to impede treatment adherence. However, if participants have legitimate issues accessing the internet they will not be penalised, rather we will reschedule sessions when the participant regains a stable internet connection. In addition, if study incentives are less powerful than gambling, study incentives will not be able to successfully compete with gambling. Also, if participants have no verifiable records to report abstinence (eg, they have no bank accounts), they will not be able to earn study credit based on financial records. Furthermore, if participants are paid in cash they can circumvent our assessment procedures. Moreover, as only one previous study reported CM as a treatment for gambling,<sup>12</sup> our results need to be interpreted with caution. Also, as the CM procedure outlined here is based on the pharmacological substance dependence



literature,<sup>21</sup> any material difference between disorders may require alternative implementations for CM to be successful,<sup>30</sup> and this must be considered when reviewing our results. Also, the incentives might be too small to retain participants in the study during the early stages of treatment, although CM studies report this is more likely in CM alone designs.<sup>21</sup> Finally, as participants are randomly allocated to the CM+ or CBT groups, possible confounding variables might bias group outcomes. Consequently, we will check for known confounders in the analyses (ie, gender, gambling severity, primary gambling activity).

## CONCLUSIONS

CM provides small incentives that reinforce abstinence and improve treatment attendance and retention rates.<sup>21 43</sup> Recently, this approach has been proposed as a treatment for gambling disorder<sup>14 16</sup>, and suggests that reinforcing gambling abstinence may be more rewarding for the gambler than gambling.<sup>14</sup> Furthermore, treatment attendance and retention rates may additionally rise using computer or internet delivered approaches.<sup>16 47</sup> These issues are especially relevant for rural and remote Albertans who face significant challenges accessing counselling services.<sup>28</sup> Consequently, this study may provide important evidence for addressing gambling treatment attendance and retention issues, as well as assessing the efficacy of using the internet and videoconferencing to provide treatment to rural and remote persons.

**Contributors** All investigators have made or will make significant contributions to the design or implementation of the study. All investigators contributed to the writing of the protocol manuscript. DRC supervises and designed the study, CSGW supervises the qualitative evaluation and contributed to the study design, TL supervises the graduate student counsellors and contributed to the study design and RH-B counselled participants and contributed to the study protocol. SO-D contributed to the writing of the protocol manuscript and assists with the data collection.

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