



AKADÉMIAI KIADÓ

Addiction substitution and concurrent recovery in gambling disorder: Who substitutes and why?

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FULL-LENGTH REPORT



ABSTRACT

Objectives: When individuals recover from gambling disorder, their involvement in other potentially addictive substances and behaviors may also subsequently increase (substitution) or decrease (concurrent recovery). The objectives of this study were to identify and compare recovery processes associated with substitution and concurrent recovery in gambling disorder. **Methods:** A mixed-method study was conducted with 185 people who were recovered from gambling disorder. Semi-structured interviews were used to: (i) establish onset and recovery of gambling disorder as well as other substance and behavioral addictions; and (ii) assess processes (e.g., reasons, emotional state, helpfulness) associated with addiction substitution and concurrent recovery. Participants also completed a survey assessing demographic characteristics, gambling behaviors, and psychological characteristics to compare demographic and clinical differences between participants who engaged in addiction substitution, concurrent recovery, or neither (controls). **Results:** The most frequently reported reason for engaging in addiction substitution was as a substitute coping mechanism. The most reported reason for engaging in concurrent recovery was due to the addictions being mutually influenced. Negative emotional states were common when engaging in both addiction substitution and concurrent recovery. Although the three groups did not differ on gambling characteristics, addiction substitution was associated with greater underlying vulnerabilities including childhood adversity, impulsivity, emotion dysregulation, and, maladaptive coping skills. **Conclusion:** Transdiagnostic treatments that target the underlying mechanisms of addictions may reduce the likelihood of engaging in addiction substitution.

KEYWORDS

addiction substitution, concurrent recovery, gambling disorder, behavioral addictions, addiction recovery

INTRODUCTION

According to Pickering, Spoelma, Dawczyk, Gainsbury, and Blaszczyński (2020), there exists two common definitions of recovery. The first consists of a medical view, which conceptualizes recovery from an abstinence-based approach. The second is the service user (i.e., people with lived experience) view, which focuses on improvement in quality of life, despite the potential persistence of symptoms (i.e., harm reduction). Recovery from gambling disorder also fits within these two domains. Indeed, individuals recovering from gambling disorder report goals consistent with both an abstinence and harm-reduction perspective (Hodgins & el-Guebaly, 2000). However, according to Nower and Blaszczyński (2008) a definition of recovery should include the absence of addiction substitution (i.e., replacement of gambling disorder with a substance addiction or other behavioral addiction). That is, regardless of conceptualizing recovery from an abstinent or harm-reduction perspective, a definition of recovery may be incomplete if addiction substitution is not considered. In the present study, we operationally defined recovery following the 5th edition of the Diagnostic Statistical

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Manual of Mental Disorders (American Psychiatric Association, 2013) as: (i) having met criteria for gambling disorder, and (ii) subsequently *not* meeting criteria in the previous 12 months prior to research involvement. We did so to provide an accurate timeline of recovery from gambling disorder using a semi-structured interview (detailed below). Furthermore, we did not define recovery in the context of addiction substitution given it is one several phenomena that can occur in the context recovery (e.g., concurrent recovery) and given the paucity of empirical studies on the topic of addiction substitution.

Addiction substitution

Of importance to the present study, there is a dearth of studies that have investigated addiction substitution among people in recovery from gambling disorder. Addiction substitution occurs when a person who, during or after recovery from gambling disorder, increases their involvement in an alternative addiction such as alcohol or video gaming (Horvath, 2006; Sussman & Black, 2008). Addiction substitution is thought to occur when the underlying mechanism leading to the addiction (e.g., emotion dysregulation) is not addressed (Kazdin, 1982). Addiction substitution has important clinical implications as it is thought to be a common process during recovery and is associated with worse treatment outcomes (Horvath, 2006; Sussman & Black, 2008).

Although a recent systematic review of addictions found that only a minority of individuals engage in addiction substitution during recovery (Kim et al., 2021), individuals who engaged in addiction substitution had greater clinical complexities and worse treatment outcomes. For example, addiction substitution was associated with increased risk of relapse, greater mental health difficulties, and worse coping skills. Unfortunately, our understanding of addiction substitution in the context of recovery from gambling is limited as only two studies to date have investigated this concept in gambling disorder with inconsistent findings (Kim et al., 2021). In a 12-month follow-up study of people seeking treatment for gambling disorder, Toneatto, Skinner, and Dragonetti (2002) did not find support for the concept of addiction substitution with only 4 (5.1%) people in the sample reporting a new onset substance use during recovery. On the other hand, a more recent study of younger adults found that a decrease in gambling was associated with increased alcohol consumption and computer use, suggesting a substitution effect (Black, Allen, & Bormann, 2021).

The lack of empirical studies suggests a greater need to investigate this important clinical concept. A greater understanding of addiction substitution may help explain why 1 in 5 people in recovery from gambling disorder relapse after 12 months (Abbott, Romild, & Volberg, 2018). Understanding the reasons and risk factors of addiction substitution would help to identify individuals who may be at risk of substituting to a new addiction during recovery from gambling and can be used to reduce the risk of addiction substitution and ultimately aid in improving treatment outcomes.

Concurrent recovery

In contrast to addiction substitution, it is also possible that when recovering from gambling, people may simultaneously recover from co-occurring addictions. In other words, rather than engaging in addiction substitution, it is possible that when recovering from gambling disorder, people may engage in concurrent recovery. For example, 70% of young adults who recovered from a substance use disorder also recovered from their nicotine addiction (Agosti & Levin, 2009). Additionally, Kim et al. (2021) found that of the 68 studies that provided statistical results, 36 (52.94%) reported that individuals were likely to reduce other addictions during recovery. This contrasts with 12 studies (17.65%) that provided statistical support for addiction substitution. In other words, for every study that provided support addiction substitution, three studies suggested individuals are likely to *decrease* not increase other addictions. Indeed, concurrent recovery was more common than addiction substitution for individuals recovering from opioids (e.g., Wang, Shi, Elman, & Langleben, 2020), cannabis (e.g., Dunn & Litt, 2019), nicotine (e.g., Stahre et al., 2013), and alcohol (e.g., Magill, Barnett, Apodaca, Rohsenow, & Monti, 2009). Yet to our knowledge, no study to date has investigated the concept of concurrent recovery in the context of gambling disorder, despite concurrent recovery being relatively frequent in the context of recovery from substance use disorders (Kim et al., 2021). Understanding the factors that contribute to concurrent recovery may be of importance in assisting individuals to engage in change from not only gambling but other addictions that may co-occur with gambling, which tend to be the rule rather than the exception (Yakovenko & Hodgins, 2018).

In the present research, we addressed the limited understanding of addiction substitution and concurrent recovery through a mixed-method design. Specifically, we aimed to understand the process (e.g., reasons, emotional states) of engaging in addiction substitution and concurrent recovery. Furthermore, we compared the demographic, gambling, and psychological characteristics (childhood adversity, personality, impulsivity, emotion dysregulation, maladaptive coping, social support) between individuals with a history of gambling disorder who engaged in addiction substitution, concurrent recovery, or a control group who experienced neither.

The gambling characteristics compared between groups in the present study were selected given their robust associations with gambling disorder. In particular, gambling disorder has been linked to increased likelihood of experiencing harms and impairments across a range of domains, including those related to finances, physical health, and social functioning, among others (Browne, Goodwin, & Rockloff, 2018; Delfabbro, King, & Carey, 2021). Moreover, earlier onset of gambling is associated with elevated problem severity (Rahman et al., 2012). Motives are also important to consider given their well-established relationship with gambling disorder. Specifically, previous research has found that individuals with a gambling



disorder endorsed enhancement, coping, and social motives for gambling to a greater degree than those without a gambling disorder (Stewart & Zack, 2008). Further, financial motives (i.e., gambling to make money) have been positively linked to gambling disorder (Tabri, Xuereb, Cringle, & Clark, 2022).

The psychological characteristics, such as emotion dysregulation and impulsivity, included in the present research were chosen as they have been identified as important etiological or maintaining factors for both substance and behavioral addictions, including gambling disorder (Kim & Hodgins, 2018). Indeed, adverse childhood experiences (ACEs) (Bryant, Coman, & Damian, 2020; Poole, Kim, Dobson, & Hodgins, 2017), impulsivity (Kozak et al., 2019; Mitchell & Potenza, 2014), coping styles (particularly maladaptive styles, such as those that are avoidant; Kronenberg, Goossens, van Busschbach, van Achterberg, & van den Brink, 2015; van der Heidjen et al., 2022), and emotion dysregulation (Garke et al., 2021; Mestre-Bach et al., 2020) have each been linked to elevated substance and behavioral addiction severity. Moreover, many of these psychological characteristics have demonstrated relationships with one another, suggesting that they may co-occur or interact to confer risk for addictions. For instance, endorsing a greater number of ACEs has been linked to greater trait impulsivity (Shin, McDonald, & Conley, 2018), which may be explained by the occurrence of changes to the mesocorticolimbic dopamine system following exposure to early life stress (Sanchez & Bangasser, 2022). In addition, impulsivity may be conceptualized as a maladaptive form of coping with emotional distress. Negative and positive urgency are facets of impulsivity that reflect a tendency to behave rashly when in a state of heightened negative or positive affect, respectively (Cyders & Smith, 2008), and each has been linked to greater levels of emotion dysregulation (Reff & Baschna-gel, 2021).

METHODS

Procedure

Online advertisements (e.g., Kijiji, Craigslist, Facebook) recruited people who had recovered from gambling disorder from Canada and the United States. Participants ($N = 1,160$) who responded to the online advertisements were first directed to complete a brief online screening instrument to determine whether they were currently in recovery from gambling disorder. Participants were eligible to participate if they indicated having experienced gambling disorder in the past, which was assessed using the NORC Diagnostic Screen for Gambling Problems (NODS; Hodgins, 2004) but did not meet current diagnostic criteria for gambling disorder. A total of 274 participants met our eligibility criteria, of whom 185 were able to be re-contacted to schedule a telephone interview.

The semi-structured telephone interview consisted of several steps. First, a detailed timeline of participants' history

of gambling engagement was used to establish the self-reported onset of gambling disorder, onset of recovery from gambling disorder, and verify recovery status. The Composite International Diagnostic Interview – Gambling Subscale was used to diagnose past gambling disorder (Kessler & Üstün, 2004) with the criterion of committing illegal acts being removed to be consistent with the DSM-5 definition. Each participant's timeline of self-reported problematic involvement in and recovery from a substance (alcohol, tobacco, cannabis, sedatives, non-prescribed prescription meds, opiates, hallucinogens, crack or cocaine, stimulants, inhalants, and others) and or addictive behaviors (exercise, eating, shopping, internet, smartphone, video games, sexual activity/pornography, work, and others) was also established. To establish the timeline, participants were first asked if they had ever used the substances listed above. Next, participants were asked if they had ever used the substances regularly, and if so, the age of onset of regular use. Participants were also asked about the 12-month period in which they used the substances the most or in which the substances had caused the most problems. A similar approach was taken with behavioral addictions. The substance use module of the Structured Clinical Interview for the DSM-5 was used to diagnose substance use disorder (First, 2015). Except for gambling disorder, no validated structured clinical interviews exist to diagnose emerging behavioral addictions. Thus, an author created semi-structured interview that assessed hallmark characteristics of addictions (loss of control, need for treatment, preoccupation, mood modification, and harms) (Griffiths, 2005) was used, with participants indicating a positive response to any characteristic having been interpreted as problematically engaging in that behavior. Specifically, participants were asked:

- **Loss of control:** *did you try to quit, cut down, or control [behavioral addiction] but found you were unable to?*
- **Need for treatment:** *did you think you might have benefited from seeking help or treatment to help control [behavioral addiction] more often than not (need for treatment)*
- **Preoccupation:** *did you feel unable to control or spend a lot of time thinking about [behavioral addiction] more often than not?*
- **Mood modification:** *did you use [behavioral addiction] as a way to get out of a bad mood or to improve your mood more often than not?*
- **Harms:** *did engaging in [behavioral addiction] cause you to experience interpersonal, psychological, or physical problems?*

Participants who engaged in addiction substitution or concurrent recovery were asked a series of questions regarding their experiences. All open-ended questions were probed to elicit detailed responses and interviews were recorded and transcribed for content analyses. The mean length of the telephone interview was 55.72 min. Upon completion of the interview, participants were sent a link to complete an online battery of questionnaires and debriefed. Participants were compensated \$40 CDN.



Categorization of substitution, concurrent recovery and controls

The onset of recovery from gambling disorder was used as the reference point for establishing addiction substitution and concurrent recovery. For example, participants who reported problematic involvement in other substance or behavioral addictions during or following recovery from gambling disorder were categorized as having engaged in substitution. This definition also encompassed participants who may have had a history of substance use disorder or behavioral addiction, which then resurfaced during recovery from gambling. Participants were categorized as having engaged in concurrent recovery if they reported recovering from another problematic substance or behavioral addiction within 12 months of recovery from gambling disorder. Participants who did not engage in either substitution or concurrent recovery were categorized as control participants.

Measures

Addiction substitution and concurrent recovery. Participants who engaged in addiction substitution and concurrent recovery were asked semi-structured questions that assessed their reasons for engaging in addiction substitution and/or concurrent recovery, “Can you think of any reasons that may have influenced the increase of your [second addiction] while you were overcoming your problem with gambling?”, “Can you think of any reasons why you decreased your [second addiction] after decreasing your gambling? What were those reasons?” Participants also rated their emotional state and its influence on substitution and concurrent recovery.

Participants who engaged in addiction substitution were asked if they perceived it to be helpful in their recovery from gambling disorder, “Looking back, do you think that increasing your [second addiction] was at all helpful in terms of controlling or stopping your gambling?”, if yes, “In what ways was this helpful to you.” Harms as a result of engaging in addiction substitution were also assessed, “Did increasing your [second addiction] while overcoming your problem with gambling cause you any social, psychological, or physical problems” if yes, “What problems did you experience.” Participants who engaged in concurrent recovery were asked whether recovering from the first addiction was helpful, “Do you think decreasing your gambling was helpful in terms of overcoming your problem with [second addiction], if yes “in what ways was this helpful for you?”

Lastly, participants were asked to rate on a scale of 1 (*not at all*) to 7 (*extremely*) the extent to which: (i) their emotional states influenced engaging in addiction substitution/concurrent recovery, (ii) engaging in addiction substitution/concurrent recovery was a conscious choice, (iii) engaging in addiction substitution helped recover from gambling, and (iv) engaging in concurrent recovery was helpful in recovering from other addictions. Participants who engaged in concurrent recovery were asked to indicate the extent to which they used similar actions and strategies

to overcome gambling and other addictions, 0 (*not at all*) to 3 (*very*). The quantitative scales used in the present research (detailed below) have been validated for use in English (the language of the present study) and have demonstrated strong psychometric properties, including in the present study.

Demographics. A standard demographic questionnaire assessed participants’ age, gender, marital status, ethnicity, and employment status.

Gambling. A semi-structured interview assessed history of gambling involvement including onset of gambling disorder, duration of gambling problems, and onset of recovery. Participants also indicated whether their goal was to moderate or abstain from gambling. Work/studies, social, and family impairments were assessed with the Sheehan Disability Scale modified for gambling disorder (Hodgins, 2013). The scale is anchored from 0 (*not at all*) to 10 (*extremely*) with higher scores indicating greater impairment. The single item subscales and a summed global impairment score were used. The alpha for the total score from the present sample was $\alpha = 0.82$. Motivations for engaging in gambling during participants’ most problematic period were assessed using *The Gambling Motives Financial Questionnaire* (GMQ-F) (Dechant, 2014), a 16-item measure that assesses four motives for gambling: social, enhancement, coping, and financial. The items are anchored from 1 (*almost never/never*) to 4 (*almost always*) and scores are averaged with higher scores indicating a greater extent to which people gamble for each reason. The alphas from the present sample were: social ($a = 0.85$), enhancement ($a = 0.91$), coping ($a = 0.88$), and financial ($a = 0.87$).

Psychological characteristics. A history of gambling, substance, and mental health problems in first degree relatives was assessed using a face-valid question, “Is there anyone in your immediate biological family (e.g., parents, siblings, aunts, uncles, and grandparents) who has had a problem with [gambling, substance use, or mental health]?” The *Adverse Childhood Experiences Questionnaire* (ACEQ) (Dong et al., 2004) was used to assess 10 types of ACEs. The ACEs were summed to provide a total score. The alpha from the present study was $\alpha = 0.96$.

The 23-item *Substance Use Risk Profile Scale* (Woicik, Stewart, Pihl, & Conrod, 2009) assessed four dimensions of personality: hopelessness, anxiety sensitivity, impulsivity, and sensation seeking linked to the risk of substance use. The items were anchored from 1 (*strongly disagree*) to 4 (*strongly agree*) with several reverse-coded items. The subscale items were summed with higher scores indicating greater personality traits. The alphas from the present sample were: hopelessness ($a = 0.87$), anxiety sensitivity ($a = 0.76$), impulsivity ($a = 0.75$), and sensation seeking ($a = 0.69$). The *UPPS-P Short Form* (Woicik et al., 2009) assessed five facets of trait impulsivity: negative and positive urgency, sensation seeking, lack of premeditation, and lack of perseverance. The UPPS-P contains 20 items, including



reverse-coded items and was anchored from 1 (*agree strongly*) to 4 (*disagree strongly*). The items were averaged for each subscale and higher scores reflect greater impulsive traits. The alphas from the present sample were: negative urgency ($\alpha = 0.77$) and positive urgency ($\alpha = 0.83$), sensation seeking ($\alpha = 0.67$), lack of premeditation ($\alpha = 0.78$), and lack of perseverance ($\alpha = 0.67$).

Emotion dysregulation was measured using the 36-item *Difficulties in Emotion Regulation Scale* (DERS) (Gratz & Roemer, 2008). The items were anchored from 1 (*almost never: 0-10%*) to 5 (*almost always; 91-100%*). The total score indicates greater emotion dysregulation. The alpha from the present sample was $\alpha = 0.95$. Participants' use of adaptive (task-oriented) and maladaptive (emotion-focused, avoidance) coping skills was assessed using the 21-item version of the *Coping Inventory for Stressful Situations* (CISS) (Endler & Parker, 1999). The CISS items are anchored from 1 (*not at all*) to 5 (*very much*) and the subscale items were averaged to provide a measure of participants' use of task-oriented, emotion-focused, and avoidance coping with higher scores indicating greater use. The alpha from the present sample was $\alpha = 0.84$. The 12-item *Multidimensional Scale of Perceived Social Support* (MSPSS) (Zimet, Dahlem, Zimet, & Farley, 1988) was used to assess perceived social support. The scale items were anchored from 1 (*very strongly disagree*) to 7 (*very strongly agree*) and were averaged to provide an overall measure of social support. Higher scores indicated greater perceived social support. The alpha from the present sample was ($\alpha = 0.93$).

Statistical analysis

The semi-structured interviews were analyzed using a multi-step process. First, content analysis (Elo & Kyngäs, 2008) was used to identify and group responses ($N = 2,607$) with the same meaning or expression through a deductive approach by two independent reviewers using NVivo 12 (QSR International Pty Ltd, 2020). Thereafter, an inductive approach guided by the empirical literature was used to further reduce the large number of categories through an iterative process. An independent reviewer coded a random 15% of responses ($n = 391$) to assess the reliability of this coding scheme. Given the unequal marginal distributions, percentage agreement versus Kappa was calculated (Cicchetti & Feinstein, 1990; Cook, 2005) similar to previous studies (Hodgins & el-Guebaly, 2000; Hodgins, Makarchuk, el-Guebaly, & Peden, 2002). There was a high level of agreement in the coding scheme (89.3%). Disagreements were resolved through consensus and mediated by a third reviewer.

Descriptive statistics were used to report the most frequently reported recovery processes for addiction substitution and concurrent recovery. To examine differences in demographic, gambling, and psychological characteristics between the groups, one-way analyses of variance (ANOVA) with Bonferroni post-hoc tests were used for continuous variables. Kruskal-Wallis H Tests were used when removal of outliers affected the results or when assumptions of

homogeneity of variances were violated. Significant tests were followed up with Dunn's procedure with pairwise comparisons with Bonferroni correction. We opted to conduct ANOVAs and Kruskal-Wallis H Tests over multinomial logistic regression for several reasons. First, the variables in our model were highly correlated with correlations of 0.86 for some of the gambling variables and 0.68 in the psychological variables. When variables are highly correlated in regression models, the effect of each of the correlated variables become less precise (Ranganathan, Pramesh, & Aggarwal, 2017). Secondly, a rule of thumb for regression analyses is to have 10 observations (i.e., participants) for each variable entered (Ranganathan et al., 2017), which was not the case for the present study, whereas ANOVAs are more robust to sample size. For categorical variables, chi-square tests were conducted, and Fisher's Exact Tests were used when the expected cell counts were less than five. We did not correct for multiple comparisons for the main analyses given the largely exploratory nature of the research and as the results may be used to generate hypotheses for future research (Armstrong, 2014). Effect sizes were also calculated for the between-group comparisons. For chi-square and Fisher's Exact tests, Cramer's V was calculated. For ANOVAs and the Kruskal-Wallis H Tests, the effect sizes are reported as eta squared.

Ethics

The study procedures were carried out in accordance with the Declaration of Helsinki. Ethics approval was granted by the author's Research Ethics Board prior to the study. All participants provided informed consent to participate in the research.

RESULTS

The mean age of the total sample was 39.35 years ($SD = 11.10$) and there were slightly more males (56.8%) than females (43.2%). Most participants reported being single (61.8%) and more than half the sample identified themselves as being White ($n = 117$; 63.2%). The mean age of first experiencing gambling disorder was 32.96 years ($SD = 9.88$) with an average duration of 5.94 years ($SD = 7.36$). During the most problematic 12-month period, participants met on average of 7.96 ($SD = 1.10$) of the nine DSM-5 criteria for gambling disorder. The average onset of recovery was age 35.81 years ($SD = 10.10$). Although participants were required for inclusion to not meet the DSM-5 criteria for gambling disorder currently, 26.5% reported at least some gambling in the past year.

Of the 185 participants, 29 engaged in only addiction substitution, 44 engaged in only concurrent recovery, and 39 participants described neither (i.e., controls). Of the remaining 73 participants, 24 engaged in reverse substitution (i.e., recovered from substance use or behavioral addiction and substituted to gambling) and 38 engaged in a combination of concurrent recovery, substitution, or reverse



substitution. Eleven participants' timelines provided insufficient details to be categorized, mostly related to numerous, highly complex periods of problematic engagement in substance and behavioral addictions.

For the qualitative results, we analyzed the 38 instances of addiction substitution and the 67 instances of concurrent recovery reported by the participants. The quantitative results consisted of the between-group analyses comparing the demographic, gambling, and psychological characteristics were conducted with the 39 control participants, 44 participants who engaged in only concurrent recovery, and 38 participants who engaged in addiction substitution, including nine participants who engaged in both substitution and reverse substitution (i.e., recovered from a substance use disorder or behavioral addiction and substituted to gambling disorder and also substituted to gambling after recovering from an addiction). Of note, we included the nine participants who engaged in substitution and reverse substitution, given these participants also reported having increased another addiction after recovering from gambling. In other words, they engaged in similar recovery processes. Additionally, no significant differences were found between participants who engaged in substitution and those who engaged in both substitution and reverse substitution on demographic, gambling, or psychological characteristics, which supports collapsing between the two groups to increase power and sample size.

Qualitative results

Addiction substitution. Thirty-eight participants completed a semi-structured interview regarding experiences of engaging in addiction substitution. Table 1 provides the categories and description of the reasons for engaging in addiction substitution. The most endorsed substitutions were those conceptualized as behavioral addictions; eating (18.6%), internet (11.6%), and smartphone (11.6%), and the most common substituted substance addictions were high base rate addictions; alcohol (11.6%), cannabis (4.7%), and tobacco (4.7%). Most participants (75.8%) reported that addiction substitution occurred within two years of recovering from gambling. The mean rating on the Likert scale from 1 (*not at all*) to 7 (*extremely*) of whether engaging in addiction substitution was a conscious choice was 4.10 ($SD = 1.94$).

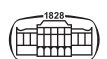
Content analysis revealed seven categories of reasons for engaging in addiction substitution. The most common reason was that the substitute addiction served as an *alternate coping mechanism*, which was endorsed by nearly half (45.9%) of the participants. Specifically, the participants reported that the substitute addiction alleviated boredom and negative affect. The substitute addictions were also used to fill the void left by gambling as produced a similar "high". *Behavioral strategy* (27.0%) was the second most endorsed reason for engaging in addiction substitution. Participants noted that the substitute addiction helped avoid triggers and to pass the time. Interestingly, 16.2% of participants *did not identify a reason* for engaging in addiction substitution. The

Table 1. Categories and description of participants reported reasons for engaging in addiction substitution

Category and subcategory	Description
Behavioural strategy	<ul style="list-style-type: none"> Engagement in secondary addiction provided a distraction or helped to avoid other addictions
Avoid triggers	<ul style="list-style-type: none"> Engagement in secondary addictive behavior helped to avoid gambling
Keep busy	<ul style="list-style-type: none"> Engagement in secondary addictive behavior helped to pass the time
Coping	<ul style="list-style-type: none"> Engagement in secondary addictive behavior provided a sense of escape, comfort, or decreased stress
Boredom	<ul style="list-style-type: none"> Engagement in secondary addictive behavior helped to mitigate boredom
Compensation	<ul style="list-style-type: none"> Engagement in secondary addictive behavior improved mood, or provided a similar experience to gambling
Negative affect	<ul style="list-style-type: none"> Engagement in secondary addictive behavior helped to mitigate negative affect
Financial reasons	<ul style="list-style-type: none"> Wanted to save money or spend it elsewhere
Increased self-esteem	<ul style="list-style-type: none"> Increased sense of control or self-worth
Major life events	<ul style="list-style-type: none"> Birth of a child, marriage, divorce, start of a new relationship, death of a close friend or loved one, moving to a new location
No reasons	<ul style="list-style-type: none"> No reason indicated
Other	<ul style="list-style-type: none"> Infrequent responses that are not categorizable into any existing categories
Uncodeable	<ul style="list-style-type: none"> Vague, unclear, or nonsense responses

next commonly reported reasons included *other* (e.g., mental shift, 13.5%), *increased self-esteem* (8.1%), *financial reasons* (8.1%), and *major life events* (5.4%).

Most participants (57.9%) reported their emotional state at the time of engaging in addiction substitution was negative with sadness and depression (29.7%) as well as stress/anxiety (13.5%) being the most common. A total of 26.3% reported their emotional state was positive. The mean response on the Likert scale from 1 (*not at all*) to 7 (*extremely*) on whether participants perceived their emotional states influenced the increase in other addictions was moderately high $M = 5.45$, $SD = 1.57$ suggesting that



participants perceived that their emotional states had a significant influence on increasing their secondary addiction.

A total of 70.3% of participants reported that engaging in addiction substitution was helpful in overcoming their gambling. The mean response on the Likert scale of 1 (*not at all*) to 7 (*extremely*) regarding the helpfulness of engaging in addiction substitution in overcoming gambling was moderate $M = 3.92$ ($SD = 2.13$). The most reported way addiction substitution was helpful was providing a *distraction from gambling* (46.2%) followed by *functional equivalents* (i.e., provided similar reinforcements, 26.9%), and that the addiction substitution was used as a *harm reduction strategy* (15.4%). Table 2 provides the categories and description of whether participants found engaging in addiction substitution was helpful in their recovery. More than half (64.9%) of the participants reported

Table 2. Categories and description of participants perceptions of whether engaging in addiction substitution was helpful in their recovery

Category and subcategory	Description
Distraction	<ul style="list-style-type: none"> Engagement in secondary addictive behavior aided in avoiding gambling
Keep busy	<ul style="list-style-type: none"> Engagement in secondary addictive behavior helped to pass the time
Functional equivalence	<ul style="list-style-type: none"> Secondary addiction provided an alternative gambling
Harm reduction	<ul style="list-style-type: none"> Secondary addictive behavior was perceived as less harmful than gambling, or as a way to decrease involvement in gambling
No	<ul style="list-style-type: none"> Increase in secondary addictive behavior was not seen as helpful in recovery from primary addictive behavior
Other	<ul style="list-style-type: none"> No responses
Financial reasons	<ul style="list-style-type: none"> Secondary addictive behavior provided a source of income
Less stigma	<ul style="list-style-type: none"> Secondary addictive behavior was more socially acceptable
Sense of control	<ul style="list-style-type: none"> Greater sense of control over secondary addictive behavior
Yes	<ul style="list-style-type: none"> Increase in secondary addictive behavior was helpful in recovery from gambling. No detail given as to how
Other	<ul style="list-style-type: none"> Infrequent responses that are not categorizable into any existing categories
Uncodeable	<ul style="list-style-type: none"> Vague, unclear, or nonsense responses

experiencing harms from addiction substitution. Of the participants who indicated experiencing harms, the most reported harm experience was *physical harms* (e.g., lack of energy, weight-related problems), followed by *psychological harms* (e.g., anxiety, depression) (45.8%), *interpersonal harms* (20.8%), *financial* (9.1%), *work or school* (8.3%) and *reputational harms* (4.2%).

Concurrent recovery. Sixty-seven participants completed a semi-structured interview regarding their experiences in engaging in concurrent recovery. Table 3 provides the categories and description of the reasons for concurrent recovery. In contrast to addiction substitution, in which behavioral addictions were most common, alcohol (31.3%) was the most frequently reported addiction during concurrent recovery, followed by cocaine (8.8%), internet (8.8%), and shopping (8.8%). Participants' mean score on the Likert scale of 1 (*not at all*) to 7 (*extremely*) assessing whether engaging in concurrent recovery was a conscious choice was moderately high ($M = 5.66$, $SD = 1.83$), suggesting that concurrent recovery occurred through a conscious effort.

Although concurrent recovery was defined as having occurred within the same 12-month period, participants were asked to indicate whether gambling decreased first or second. Roughly half (49.3%) reported that gambling decreased first, 35.8% reported gambling decreased second and 14.9% reported they decreased simultaneously. Participant's responses were collapsed as the groups did not differ on the open-ended responses.

A total of 15 categories were identified as reasons for engaging in concurrent recovery from the open-ended responses. The most endorsed reason was due to the *addictions being connected* (23.5%). For example, participants reported that they no longer needed to cope with gambling losses with other addictions given they were abstaining from gambling. Others reported that they drank alcohol at casinos and bars, and thus it made sense to reduce their alcohol concurrently, given they were no longer visiting gambling establishments. Participants also reported *self-appraisals and a desire for self-improvement* (22.1%), which involved recovering from all problematic addictions. The next most frequently reported reason for concurrent recovery was due to *financial reasons* (16.3%) and *life improvements* (16.3%). A total of 14.7% of participants *did not indicate a reason* for engaging in concurrent recovery. Participants also noted that overcoming their first addiction was *more manageable* and provided the *confidence* needed to overcome the secondary addiction (11.8%). Other reasons included *negative affect* (4.4%), *impairments* (4.4%), *work or school problems* (4.4%), *engaging in treatment* (2.9%), *major life events* (2.9%), *family pressure* (1.5%) and *abstinence from all addictions* (1.5%).

Similar to participants' emotional states when engaging in addiction substitution, the majority of the participants reported that their emotional state was negative (64.7%). Depression and sadness (20.6%) were the most reported negative emotions followed by anger and irritability (10.3%) and emotional fatigue (10.3%). Relatively few participants



Table 3. Categories and description of participants reported reasons for engaging in concurrent recovery

Category and subcategory	Description
Abstinence	<ul style="list-style-type: none"> Was abstaining from addictive behaviors would be best for recovery
Addictions connected	<ul style="list-style-type: none"> Gambling problem was associated with other addictive behavior(s)
Simultaneous use	<ul style="list-style-type: none"> Gambling problem led to engagement in other addictive behavior(s), or vice versa
Family pressure	<ul style="list-style-type: none"> Addiction caused familial discord
Financial reasons	<ul style="list-style-type: none"> Financial strain
Life improvement	<ul style="list-style-type: none"> Wanted to improve quality of life
Major life events	<ul style="list-style-type: none"> Birth of a child, marriage, start of a new relationship, death of a close friend or loved one, moving to a new location
More manageable	<ul style="list-style-type: none"> Gambling was the worse problem Was unable to stop both addictions at once
Easier to control	<ul style="list-style-type: none"> Gambling was easier to control
Negative affect	<ul style="list-style-type: none"> Depression, anxiety, stress, shame, embarrassment, loneliness fear, anger, boredom
Negative impairments	<ul style="list-style-type: none"> Hit rock bottom Lost everything (e.g., money, family)
Self-appraisal (improvement)	<ul style="list-style-type: none"> Weighed of pros and cons of continued engagement in addiction Change in lifestyle provided benefits to quality of life Desired self-improvement
Self-improvement	<ul style="list-style-type: none"> Engaged in personal development initiatives
Treatment	<ul style="list-style-type: none"> Being in treatment prevented access to addictive behavior(s)
Work or school reasons	<ul style="list-style-type: none"> Secondary addiction impaired work or school performance Wanted to pursue future career goals
No reason	<ul style="list-style-type: none"> No reason indicated
Other	<ul style="list-style-type: none"> Infrequent responses that are not categorizable into any existing categories.
Uncodeable	<ul style="list-style-type: none"> Vague, unclear, or nonsense responses

(8.8%) reported a positive emotional state when they began to engage in concurrent recovery. Participants' mean response on the Likert scale of 1 (*not at all*) to 7 (*extremely*) assessing whether their emotional state influenced concurrent recovery was moderately high, $M = 5.71$ ($SD = 1.40$), suggesting emotional experiences has an impact on concurrent recovery.

Most participants (92.5%) reported that decreasing the first addiction was helpful in recovering from their secondary addiction. The participants' mean score on the Likert scale assessing the helpfulness of overcoming their first addiction on reducing secondary addiction was moderately high ($M = 5.67$, $SD = 1.75$). The most reported reason for how decreasing their first addiction helped engage in concurrent recovery was due to *addictions being connected* (42.6%). Participants reported *simultaneously using* gambling and other addictions and thus recovering from one addiction automatically led to a decrease in the second addiction. Participants also noted that recovering from the first addiction resulted in *reduced triggers, less need to cope with negative emotions and changes in environment*, which were all associated with the addictions being connected to one another. Recovering from the first addiction also resulted in *increased motivation and self-efficacy* (13.2%) to overcome their secondary addiction as well as providing *clarity and self-awareness* (11.8%). A total of 4.4% provided *other* (e.g., financial) reasons, and 2.9% reported that reducing the first addiction was helpful as they used the *same techniques* to overcome the secondary addiction. Table 4 provides the categories and descriptions of how recovering from one addiction was helpful in overcoming their second addiction. Participants' mean response ($M = 2.48$, $SD = 0.82$) on the Likert scale of 1 (not at all) to 3 (completely) was moderately high when asked to rate whether the strategies were similar when recovering from both addictions.

Quantitative results

For parsimony, the between-group analyses comparing the demographic, gambling, and psychological characteristics were conducted with the 39 control participants, 44 participants who engaged in only concurrent recovery, and 38¹ participants who engaged in addiction substitution, including participants who engaged in both substitution and reverse substitution (i.e., recovered from a substance use disorder or behavioral addiction and substituted to gambling disorder).

Demographics. Participants who engaged in addiction substitution were older than those who engaged in concurrent recovery or control participants. Participants who self-identified as White and reported being unemployed were more likely to have engaged in addiction substitution. Male gender was associated with concurrent recovery. No differences were found in marital status or education between the three groups, $ps > 0.318$ (Table 5).



Table 4. Categories and descriptions of participants perceptions of whether recovering from one addiction was helpful in overcoming their second addiction

Category and subcategory	Description
Addictions connected	<ul style="list-style-type: none"> • Decreased need for secondary addiction as a coping mechanism • Decreased urge to engage in secondary addiction • Reduced time spent in triggering environments
Fewer triggers	<ul style="list-style-type: none"> • Decrease in primary addiction made avoiding triggers for secondary addiction
Less need for coping	<ul style="list-style-type: none"> • Was no longer dependent on addictive behaviors to cope
Simultaneous use	<ul style="list-style-type: none"> • Gambling problem led to engagement in other addictive behavior(s), or vice versa
Change in environment	<ul style="list-style-type: none"> • Spending less time in environments associated with primary addiction made led to decreased engagement in secondary addiction
Clarity and self-awareness	<ul style="list-style-type: none"> • Decrease in primary addiction allowed for clearer thought regarding secondary addiction, or current place in life
Increased motivation and self-efficacy	<ul style="list-style-type: none"> • Decrease in primary addiction led to increased feelings of self-control, confidence, and motivation • Decrease in primary addiction showed it was possible to begin recovery from secondary addiction
Manageability	<ul style="list-style-type: none"> • Decreasing primary addiction made recovery from secondary addiction easier
Same techniques	<ul style="list-style-type: none"> • Recovery strategies used for primary addiction provided a framework for recovery from the secondary addiction
Other	<ul style="list-style-type: none"> • Desire to reduce self-destructive behaviors
Financial	<ul style="list-style-type: none"> • Financial
Willpower	<ul style="list-style-type: none"> • Willpower
Other	<ul style="list-style-type: none"> • Infrequent responses that are not categorizable into any existing categories
Uncodeable	<ul style="list-style-type: none"> • Vague, unclear, or nonsense responses

Gambling. Addiction substitution was associated with a greater duration of gambling problems. No significant

differences were found between the groups regarding the onset of problem gambling, recovery onset, goals, DSM-5 symptoms, impairments due to gambling, and gambling motives, $ps > 0.055$ (Table 6).

Psychological characteristics. Participants who engaged in addiction substitution were more likely to report a familial history of substance use and mental health problems. Addiction substitution was associated with increased childhood adversity compared to participants who engaged in concurrent recovery. No other significant differences were found. Participants who engaged in addiction substitution reported greater levels of impulsivity. In particular, these participants reported greater negative urgency and lack of premeditation compared to control participants. There was a significant group difference in impulsivity as assessed by SURPS. However, pairwise comparisons using Dunn's procedure with post-hoc adjusted p values did not reach statistical significance. Participants who engaged in addiction substitution reported greater emotion dysregulation and maladaptive coping compared to control participants. Participants who engaged in concurrent recovery reported lower social support compared to control participants. No significant differences were found in family history of gambling problems; SURPS hopelessness, sensation seeking, or anxiety sensitivity subscales; UPPS-P positive urgency, lack of premeditation, or sensation seeking subscales; or avoidance-oriented coping between the groups $ps > 0.085$ (Table 7).

DISCUSSION

Changes in other addictions, including potential increases in other substance and behavioral addictions during recovery are common (Kim et al., 2021). Yet, only two studies to date have examined changes in other addictions during recovery from gambling disorder (Black et al., 2021; Toneatto et al., 2002). In the present research, we explored these experiences among people who were recovered from gambling disorder.

Behavioral addictions such as eating, internet, and smartphone were the most frequent substitute addictions during recovery from gambling, which speaks to the importance of assessing increases in behavioral addiction during recovery from gambling and other addictions. A potential reason that behavioral addictions were most common may be because behavioral addictions, except for gambling (and potentially gaming), are perceived to be less addictive than psychoactive substances (Konkolý Thege et al., 2015). Although gambling is also a behavioral addiction, it is currently the only behavior included as a behavioral addiction in the DSM-5, whereas gaming disorder is also included in the ICD-11. Consequently, gambling is widely recognized in society as an addiction, whereas other potential behavioral addictions are less likely to be considered an addiction (Grant, Potenza, Weinstein, & Gorelick, 2010; Petry, Zajac, & Ginley, 2018). Furthermore, a study on the perceived addictiveness of substance and behavioral



Table 5. Comparison of demographic characteristics and family history between participants who engaged in addiction substitution, concurrent recovery, and controls

Characteristics	Control (n = 39)	Concurrent (n = 44)	Substitution (n = 38)	χ^2	F	p	ES
Age, M (SD)	37.13 (11.44) ^a	36.23 (9.80) ^a	42.76 (10.65) ^b		4.63	0.012*	0.07
Gender, n (%)				6.56		0.038*	0.23
Male	19 (48.7%)	33 (75.0%)	21 (60.2%)				
Female	20 (51.3%)	11 (25.0%)	17 (35.4%)				
Marital status, n (%)				2.07		0.355	0.13
In a relationship	15 (39.5%)	14 (31.8%)	18 (47.4%)				
Single	23 (60.5%)	30 (68.2%)	20 (52.6%)				
Ethnicity, n (%)				15.12		0.001*	0.35
White	23 (59.0%)	16 (36.4%)	30 (78.9%)				
Non-White	16 (41.0%)	28 (63.6%)	8 (21.1%)				
Education, n (%)				2.29		0.318	0.14
High school or less	8 (20.5%)	5 (11.4%)	9 (23.7%)				
Trades, college, university	31 (79.5%)	39 (88.6%)	29 (76.3%)				
Employment, n (%)				12.72		0.013*	0.23
Full-time	25 (64.1%)	28 (63.6%)	21 (55.3%)				
Part-time or student	10 (25.6%)	7 (15.9%)	2 (5.3%)				
Retired, unemployed, other	4 (10.3%)	9 (20.5%)	15 (39.5%)				

Note. Subscripts denote significant differences. Effect sizes were partial eta squared (F tests) and Cramer's V (χ^2) tests. * $p < 0.05$.

Table 6. Comparison of problematic gambling, gambling motivations and harms between participants who engaged in addiction substitution, concurrent recovery, and controls

Gambling Variables	Control (n = 39)	Concurrent (n = 44)	Substitution (n = 38)	χ^2	F	p	η^2
Onset of Problem Gambling, M (SD)	29.97 (9.41)	28.55 (8.60)	29.14 (9.05)		0.24	0.791	0.004
Recovery Onset, M (SD)	33.42 (9.56)	34.30 (9.87)	37.06 (10.05)		1.28	0.283	0.03
Gambling Goal %				1.63		0.443	0.12
Abstinence	79.5%	72.7%	84.2%				
Moderation	20.5%	27.3%	15.8%				
Duration of Gambling Problems, Median in Years	2.00 ^a	2.00 ^{ab}	5.00 ^b	13.44		0.001*	0.11
DSM-5 symptoms, M(SD)	7.69 (1.17)	8.15 (0.99)	8.06 (1.22)		1.69	0.890	0.03
Sheehan Disability Scale							
Work/school, M(SD)	5.13 (3.03)	6.59 (3.11)	5.89 (3.41)		2.19	0.117	0.04
Social life, Median	7.00	8.00	7.00	4.64		0.098	
Family life/home responsibility, Median	8.00	8.00	8.00	3.20		0.201	
Total, M(SD)	17.62 (7.80)	21.61 (6.20)	19.24 (8.62)		2.97	0.055	0.05
Gambling Motives							
Enhancement, M(SD)	2.96 (0.75)	3.01 (0.87)	3.07 (0.90)		0.15	0.863	0.002
Social, M(SD)	2.17 (0.88)	2.35 (0.83)	2.03 (0.79)		1.51	0.224	0.03
Coping, M(SD)	2.62 (0.87)	2.71 (0.85)	2.83 (0.94)		0.53	0.589	0.01
Financial, M(SD)	3.01 (0.85)	3.18 (0.85)	2.99 (0.97)		0.61	0.544	0.01

Note. Subscripts denote significant differences. η^2 = eta squared. Medians indicate Kruskal-Wallis H Test. * $p < 0.05$.

addictions found that while gambling was perceived just as addictive as substances such as alcohol and cannabis, everyday behaviors such as shopping, sex, and work were rated considerably lower as being addictive (Konkolý Thege et al., 2015). Thus, the increase in addictions may occur due to individuals' lack of awareness of the potential addictiveness and harms of behavioral addictions. Indeed, participants were likely to report that the increase in other potentially addictive substances and behaviors was not a conscious choice. The most common reason for increasing other potentially addictive substances and behaviors during

recovery was as an *alternate coping mechanism*. Most participants described their emotional states as negative during the period that they were engaging in addiction substitution. Interestingly, most participants attributed increasing use of potentially addictive substances and behaviors as helpful in overcoming gambling by providing *distraction* and *similar reinforcements*. However, participants also acknowledged that the substitute addiction resulted in harm, most commonly *physical harms*, which is likely due to problematic eating being the most frequently reported substitute addiction.

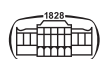


Table 7. Comparison of psychological characteristics between participants who engaged in addiction substitution, concurrent recovery, and controls

Variables	Control (n = 39)	Concurrent (n = 44)	Substitution (n = 38)	χ^2	F	p	ES
Family history, n (%)							
Gambling	12 (31.6%)	13 (29.5%)	17 (44.7%)	2.35		0.308	0.14
Substance use	15 (41.7%)	20 (47.6%)	30 (78.9%)	12.32		0.002*	0.33
Mental health	10 (25.6%)	8 (18.6%)	24 (63.2%)	19.83		<0.001*	0.41
ACES (Total)	3.54 (2.49) ^{ab}	3.34 (2.32) ^a	4.76 (2.48) ^b		3.98	0.021*	0.06
SURPS							
Hopelessness, Median	12.00	12.00	12.50	4.92		0.085	0.03
Sensation seeking, Median	16.00	15.00	13.00	3.07		0.216	0.01
Impulsivity, Median	12.00 ^a	12.00 ^a	16.50 ^a	6.11		0.047*	0.04
Anxiety sensitivity, M(SD)	13.09 (3.24)	13.00 (2.57)	13.76 (2.98)		0.783	0.460	0.01
UPPS-P							
Negative urgency, M(SD)	2.48 (0.81) ^a	2.70 (0.66) ^{ab}	2.91 (0.70) ^b		3.36	0.038*	0.05
Positive urgency, M(SD)	2.41 (0.89)	2.37 (0.68)	2.52 (0.81)		0.40	0.669	0.01
Sensation seeking, M(SD)	2.63 (0.73)	2.64 (0.60)	2.66 (0.68)		0.02	0.986	0.01
Lack of perseverance, Median	1.75	2.00	1.75	1.98		0.371	0.00
Lack of premeditation, M(SD)	1.80 (0.52) ^a	1.97 (0.50) ^{ab}	2.13 (0.66) ^b		3.32	0.040*	0.05
DERS (Total)	86.57 (23.79) ^a	92.69 (25.92) ^{ab}	100.99 (25.19) ^b		3.22	0.044*	0.05
CISS							
Task-oriented, M(SD)	3.85 (0.64) ^a	3.57 (0.71) ^{ab}	3.22 (0.87) ^b		6.55	0.002*	0.10
Emotion-focused, M(SD)	2.88 (0.91) ^a	3.26 (1.02) ^{ab}	3.50 (1.10) ^b		3.60	0.030*	0.06
Avoidance, Median	3.14	2.71	2.86	0.55		0.760	0.00
MSPSS (Global)	5.08 ^a	4.67 ^b	4.83 ^{ab}	8.46		0.015*	0.07

Note. ACEs = Adverse Childhood Experiences, SURPS = Substance Use Risk Profile, DERS = Difficulties in Emotion Regulation Scale, CISS = Coping Inventory for Stressful Situations, MSPSS = Multidimensional Scale of Perceived Social Support. Subscripts denote significant differences. Effect sizes were eta squared, except for family history in which Cramer's V was used. Medians indicate Kruskal-Wallis H Test. * $p < 0.05$.

Taken together, the reports from people who engaged in addiction substitution provide support for the notion of functional equivalents (Adler, 1966; Kazdin, 1982), which states that individuals are likely to engage in addiction substitution if the underlying issues (e.g., emotion dysregulation) that serve as maintaining factors for the disorder are not addressed in treatment. In the context of the present research, the results suggest that individuals increase their engagement in other potentially addictive substances and behaviors as a maladaptive coping mechanism, a role that gambling once served. Over time, individuals may also become dependent on the substitute as a maladaptive coping mechanism, which leads to harm and the development of a substitute addiction. Indeed, psychiatric comorbidities are highly prevalent among individuals with both gambling and substance use disorders (Ford & Håkansson, 2020; Yako-venko & Hodgins, 2018), suggesting that a range of other addictions may be relied on to cope with mental distress and associated symptoms following recovery from gambling disorder. Providing further support for the notion that substitute addictions may adopt the role of gambling disorder following recovery is evidence of cross-cue reactivity between addictive behaviors, or in other words, the phenomenon whereby an addictive behavior (e.g., gambling) begins to elicit reward responses and craving that were previously associated with another (e.g., cigarette use;

Wulfert, Harris, & Broussard, 2016). Given the prominent role of negative affectivity in addiction substitution and the high rates of comorbidity between gambling and mental health disorders, including other addictions (Dowling et al., 2015; Lorains, Cowlshaw, & Thomas, 2011), integrated treatments that address gambling disorder and their mental health comorbidities are warranted and may ultimately reduce the likelihood of engaging in addiction substitution.

In contrast to addiction substitution, psychoactive substances were the most common addictions in concurrent recovery. In line with participants' emotional states when engaging in addiction substitution, participants described a predominant negative state. Furthermore, few participants noted that their emotional state was positive at the time of engaging in concurrent recovery (8.8%) compared to addiction substitution (26.3%). A potential reason may be the central role of coping motives in addictions (Kim & Hodgins, 2018). It is possible that participants may have begun using the substitute addictions to cope with negative affect, resulting in improved mood. On the other hand, participants who engaged in concurrent recovery may no longer be using addictions to cope with negative affect and may not report an increase in positive moods until they are able to develop adaptive coping mechanisms.

Participants reported that tackling concurrent recovery was a conscious choice and that the *addictions were connected*.



In other words, they engaged in other addictions while gambling within the same context or simultaneously. As such, when they began to overcome one addiction such as gambling, it reduced opportunities to engage in other substances and behaviors, such as alcohol and gaming. Participants noted that reducing one addiction was helpful for concurrent recovery as it *reduced triggers* and *reduced the need to cope*. For example, participants noted they no longer needed to use alcohol or cannabis to cope with gambling losses. These descriptions suggest that highlighting the potential relationship between gambling and other addictions may increase the likelihood of individuals engaging in concurrent recovery.

Demographic, gambling, and psychological differences

There were several demographic differences between participants who described either addiction substitution or concurrent recovery, or did neither. Participants who engaged in substitution were more likely to be older and White and were less likely to be employed. In contrast, participants who described concurrent recovery were more likely to be male. There are several potential reasons for these differences. For example, regarding employment differences, it is possible that the problematic engagement in substitute addictions may have resulted in impairments in work (Müller et al., 2019; Thørrisen et al., 2019). Indeed, impairments in work were reported by a proportion of participants who reported experiencing harms because of addiction substitution. The finding that men were more likely to experience concurrent recovery may be due to the higher preponderance of substance use disorders in men (McHugh, Votaw, Sugarman, & Greenfield, 2018; Rehm & Shield, 2019; Zakiniaez & Potenza, 2018). Future research exploring the differences in ethnicity between those who engage in addiction substitution, concurrent recovery, and control participants would be beneficial.

Except for the duration of gambling problems, no other significant differences were found between the groups on gambling-related variables. In contrast, there were significant differences in several psychological characteristics. In general, participants who engaged in addiction substitution reported greater psychological vulnerabilities including a family history of substance use and mental health problems, childhood trauma, emotion dysregulation, and maladaptive coping skills, as compared to control participants. Although these psychological characteristics have been associated with the increased risk of gambling disorder, they are also characteristics that increase the risk of other substance and behavioral addictions (Kim & Hodgins, 2018). These results speak to potential underlying vulnerabilities that may make certain individuals who have recovered from gambling more likely to substitute with other potentially addictive substances and behaviors. Thus, the results of the present research provide support for the potential utility of transdiagnostic treatments that treat the underlying mechanisms (e.g., emotion dysregulation) common to addictions to enhance the efficacy of psychological treatments of addictions as well as to reduce the likelihood of engaging in addiction substitution (Kim & Hodgins, 2018).

Limitations

The cross-sectional design and use of retrospective reports may have limited participants' ability to recall the process of engaging in addiction substitution and concurrent recovery. To address this potential limitation, participants were provided with memory cues to enhance recall (i.e., asked to recall significant life events). Having said that, future research with prospective longitudinal studies is needed to further understand the process of addiction substitution and concurrent recovery.

A second limitation is that participants' emotional states were assessed through self-reports. Given the prominent role of negative affectivity in influencing addiction substitution and concurrent recovery, and high rates of mental health comorbidity in gambling disorder, future research using validated clinical interviews to explore the role of mental health disorders in influencing addiction substitution and concurrent recovery would be valuable. Third, not all participants were able to be categorized as having engaged in addiction substitution or concurrent recovery. However, this was due to the inherently complex process of recovering from addictions, and given that individuals may engage in addiction substitution, concurrent recovery, or both over the course of their addiction careers.

CONCLUSION

Recovery from gambling disorder can involve changes in other addictions. Although it has been suggested that complete recovery from gambling should require the absence of addiction substitution (Nower & Blaszczynski, 2008), there has been a paucity of empirical literature on this important clinical concept. The present research adds to the literature on addiction substitution and concurrent disorder during recovery from gambling by delineating the process of engaging in addiction substitution and concurrent recovery as well as differences in demographic, gambling, and psychological characteristics. The results of the present research may help enhance the treatment of gambling disorder, specifically, and addictions more generally by highlighting the potential importance of targeting underlying vulnerabilities during recovery from addictions to reduce the likelihood of engaging in substitution. Furthermore, the results suggest the potential importance of preventing the development of other addictions during the recovery process to reduce the likelihood of individuals substituting for other addictions when recovering from GD.

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Writing – Original Draft: HSK; Writing – Review & Editing: DSM, DCH; Supervision: DCH.

Conflict of interest: HSK has received grants from the Alberta Gambling Research Institute (AGRI) and Gambling Research Exchange Ontario in the past three years. He has had conference expenses covered by AGRI and has received honorarium for conference presentation at the Partnership Symposium. DSM has received grants from AGRI and a speaker's honorarium from Spectrum Therapeutics. DCH receives partial salary support from the AGRI and has received conference travel funds from the International Conference on Behavioural Addictions, Nordic Conference on Gambling, New Horizons, Responsible Gambling Council, V Congresso Clinica Psiquitria, National Centre for Responsible Gambling conference, and the Gambling Addiction, Science, Independence, and Transparency, 4th International Symposium. On this topic, he has received grants from the Alberta Gambling Research Institute and the Canadian Centre of Substance Use and Addiction.

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