A Descriptive Analysis of Preference for and Delay Discounting of Community Reinforcers in

Substance Use Treatment

By

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Abstract

The community reinforcement approach (CRA) to substance use treatment involves providing individuals who use substances access to community and leisure activities. The delivery format of CRA and availability of community activities varies across treatment centers. Twelve community and leisure activities described as commonly incorporated into CRA were identified through a survey of clinicians and practitioners at substance use clinics and treatment centers. In a subsequent survey, people who engage in substance use self-reported their preference for each of these activities via two different methods: rating and ranking. The most frequently highly rated activities across participants included hiking and reading and the lowest rated activity across participants was attending a social club. In contrast, activities with family and friends and attending self-help groups were most highly ranked across participants whereas reading was ranked lowest across participants. Correspondence between rating and ranking of community reinforcers in individuals who use substances generally showed high variability. Delay discounting (DD) of the highest and lowest ranked community reinforcer was in turn assessed to determine if more highly preferred activities were discounted less than non-preferred activities. Discounting of the highest and lowest ranked activities on the 5-trial adjusting delay discounting task was similar, and these commodities were discounted more than hypothetical monetary rewards on an abbreviated monetary choice questionnaire (MCQ). Although further research is needed, utilization of preference assessments and subsequent DD of preferred stimuli could be a means to identify activities that may function as reinforcers in CRA to maintain abstinence in people who use substances.

Keywords: community reinforcement approach, contingency management, delay discounting, preference assessments, substance use

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Introduction

The number of individuals who use substances continues to increase each year with over 52.9 million people aged 18 and older in the United States alone using in 2019; an almost 2% increase in this population since 2018 (Substance Abuse and Mental Health Services Administration, 2020). The category of substances used refers to illicit drugs, overuse of prescription medication, alcohol, cannabis and tobacco. The fifth addition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) classifies substance use disorder (SUD) as a problematic reoccurring use of intoxicating substances that leads to significant impairment or distress in categories such as; social impairment, impaired control in addition to pharmacological criteria, and risky use (National Institute on Drug Abuse, 2018). These four major groups of symptoms are then further broken down into 10-11 diagnostic criteria having occurred within a twelve-month period of time. The number of diagnostic criteria that apply to an individual are used to classify their SUD as mild, moderate, or severe (National Institute on Drug Abuse, 2018).

As the number of individuals who use substances increases, the number of individuals seeking treatment for SUD also increases (Frakt et al., 2015; Substance Abuse and Mental Health Services Administration, 2020). Contingency management (CM) is one treatment that has been used for treatment of addiction for over three decades (Petry et al., 2017). CM is an evidence-based behavioral intervention founded mainly on the behavior analytic principle of reinforcement; tangible incentives, delivered in close temporal proximity to the occurrence of specified operant behaviors (such as abstinence and the alternative behaviors that replace substance use) will increase the frequency of occurrence of these behaviors (Dallery et al., 2015; Petry, 2011) and withholding of reinforcement decreases unwanted behaviors (such as substance

use) (Higgins & Petry, 1999). Pioneered by Skinner (1938), the basic theory of operant conditioning with increasing or decreasing behavior based on contingent consequences, including operant research conducted with animal models, provided the conceptual basis for the application of CM to substance use disorders (Higgins & Petry, 1999). CM was first employed in an outpatient setting for treatment of smoking cessation in the 1960s (Tighe & Elliott, 1968). The treatment was further developed in the 1990s for application to other substance use disorders (Davis et al., 2014; Higgins et al., 1994). CM is now applied to multiple substance abstinence programs (Hartzler & Garett, 2016) such as alcohol, cocaine, cannabis, opioids, nicotine, and methamphetamines (Benishek et al., 2014; Brown & DeFulio, 2020; Roll et al., 2013) and is also considered to be effective in reducing other drug use during opioid treatment (Ainscough et al., 2017).

There have been numerous instances where treatments with elements that resemble CM have been used in conjunction with other therapies to treat substance use or "addiction" (Stitzer et al., 1979). The complete application of CM to the treatment of substance use disorder (SUD) requires a measurable target behavior and a monitoring system to detect drugs or their metabolites (Dallery et al., 2015), and reinforcement must be provided for sustained abstinence from substance use (Sitzer, 2006). Components of CM such as duration of treatment (e.g., Roll et al., 2013), reinforcement schedule (e.g., Roll et al., 1996), how reinforcers are distributed (e.g., Petry, 2002), magnitude of reinforcement (e.g., Silverman et al., 1999), delay to reinforcement (e.g., Reilly et al., 2000) and type of reinforcement (e.g., Higgins et al., 1994) have been studied fairly extensively. Reinforcement for desired behaviors can vary from earning incentives or opportunities (e.g., Hartzler & Garrett, 2016) to monetary or voucher prizes (e.g., Silverman et al., 2008) or clinical privileges (e.g., Higgins & Petry, 1999). Commonly used reinforcer delivery

methods in contingency management include prize-based, or "fishbowl" CM and voucher CM (Petry et al., 2000, Petry & Martin, 2002). In prize-based CM individuals receive draws from a bowl of tickets that represent various prizes contingent on abstinence or target behavior. The fishbowl contains a larger quantity of tickets for small prizes compared to medium or large prizes (Petry et al., 2000). Voucher CM includes the provision of a monetary voucher each time the contingency is met. The vouchers increase in value for continuous periods of prolonged abstinence (Higgins et al., 1994). Additionally, reinforcement from alternative sources such as social settings or employment can be increased or introduced to combat the reinforcement provided by drug use (Petry et al., 2000). CM can be used in conjunction with other SUD treatments including pharmacological treatments (e.g., Petry & Martin, 2002; Poling et al., 2006), and community reinforcement approach due to the malleability of procedures to suit the setting and ability to incorporate reinforcers that are valued by clients (Hartzler & Garrett, 2016; Petry et al., 2017).

A recent systematic review and network analysis by De Crescenzo et al. (2018) showed that the most effective psychosocial treatment for long-term abstinence from substance use is the combination of (CM) in conjunction with the community reinforcement approach (CRA). CRA utilizes a biopsychosocial approach which looks at the connection between psychology, biology and socio-environmental factors acknowledging the pivotal role that environmental influences and events have on substance use and focusing on alternative social reinforcers (Roozen et al., 2004). CRA was originally developed by Hunt and Azrin in the early 1970s and utilized in the treatment of alcoholism in conjunction with CM by arranging community reinforcers such as regularly occurring, maximum quality social interactions with family and friends in addition to employment such that engaging in drinking produced a time out from these reinforcers (Hunt &

Azrin, 1973). CRA is ultimately a type of operant reinforcement that incorporates ideas from mental health initiatives such as how mental health disorders can be driven by factors in the community and by rearranging these community influences in an outpatient setting. Many social and community activities cannot be enjoyed fully or are often postponed or omitted due to substance use; therefore, developing alternative rewarding community activities incompatible with substance use can help initiate and maintain life style change in individuals with SUD (Hunt & Azrin, 1973; Schottenfeld, 2000). CRA assists individuals in reorganizing their lifestyles after discovering and learning skills to participate in substance free community activities including those involving friends and family, so that healthy, substance-free living becomes rewarding and thereby competes with substance use (Meyers et al., 2011).

The original procedure for CRA involved 4 components that included: vocational, marriage and family, social, reinforcer-access counseling, with the later including reinforcer priming (Hunt & Azrin, 1973). Vocational counselling involved having a counselor assist individuals create a resume, make calls for leads on job openings, rehearse for job interviews using role playing, placing, placing 'Situations- Wanted' ads and submitting applications where applicable. Both the marriage and family counseling components focused on restoring and improving relationships. During marriage and family counseling sessions the spouses or family members met jointly with the individual and counselor and discussed specific activities that provided reciprocal benefits to each member with the goal being to provide the individual with reinforcement for being a functional relationship partner and making drinking incompatible with the improved relationship (Hunt & Azrin, 1973). Often those with SUD have a small circle of friends who also struggle with SUD making substance use a behavioral prerequisite for engaging in and maintaining these relationships. Therefore, the social counseling component endeavoured

to have the individual no longer engage with friends known to have SUD and make social relationships contingent on sobriety (Hunt & Azrin, 1973; Kelly et al., 2014). Reinforcer access counseling assisted individuals to find public transportation, obtain a driver's license, accesses to a phones and news sources to facilitate ease of interaction with family and friends and for vocational purposes (Hunt & Azrin, 1973).

As the goal of CRA is to assist individuals in adopting an alternative more rewarding lifestyle that does not include substance use, procedures are individual to the client's needs and goals and there is no current CRA protocol that has fixed procedures from beginning to end (Kraan et al., 2018). There are currently 8 basic steps that are frequently involved in CRA: functional analysis of substance use, sobriety sampling, happiness scale, behavior skills training (BST), relapse prevention, job skills training, relationship counseling, and social and recreational counseling (Meyers et al., 2011). Functional analysis of substance use assists individuals to identify new reinforcing behaviors by assessing the positive and negative outcomes of substance use. During sobriety sampling the therapists works with the individuals to create a plan for abstinence for a limited amount of time to provide a sample of long-term abstinence. The happiness scale can be included in the development of a CRA treatment plan and provides the client with reminders that all areas of their life are important and helps identify areas of discontent to work on (Meyers et al., 2011). BST utilizes instruction modeling, feedback and roleplaying (Ward-Horner & Sturmey, 2012) to teach clients problem solving, substance refusal and communication skills that is built on during replace prevention where clients are taught to identify high risk situations (Hawkins et al., 1989; Meyers et al., 2011). Job skills training, and, relationship, social and recreation counseling follow similar procedures to those described by Hunt and Azrin (1973) with the social and recreational counseling allowing individuals the

opportunity to engage in activities to discover enjoyment without substances (Meyers et al., 2011).

Current literature on CM for addiction treatment has assessed preference for time and method of delivery of reinforcement (Hartzler & Garett, 2016) as well as tangible items to be provided as reinforcement contingent on drug free urine (Dallery et al., 2015; Stitzer, 2006). In the broader substance use literature, preference assessments have been conducted for various clinic privileges in methadone clinics (Chutuape et al., 1998; Stitzer & Bigelow, 1978). With regards to CRA specifically, the imbedded Happiness Scale that is used to assess quality of life does not directly assess preference for community reinforcers and has been the subject of few empirical studies (Roozen, 2020).

Treatments using procedures incorporating leisure activities as reinforcement for drug abstinence in a similar manner to CRA have used assessments such as the Pleasant Events Schedule (PES), Pleasant Activities List (PAL), and Leisure Interest Checklist (LIC) to assess the potential reinforcing value of leisure activities. The PES, PAL and LIC are all self-report inventories that list over 100 (PES - 320, PAL - 139, LIC - 135) potential reinforcing activities that individuals rate using a Likert-type scale and take a minimum of 15 minutes to complete (e.g., Dijkstra & Roozen, 2012; MacPhillamy & Lewinsohn, 1982; Roozen et al., 2008; Rosenthal et al., 1989). The numerical Likert scale values in each assessment differ but all ask the participant to rate their enjoyment of each activity listed. Examples of activities that are included in the PAL, PES, and LIC include: playing golf, watching TV, and playing cards (MacPhillamy & Lewinsohn, 1976; Roozen et al., 2008; Rosenthal et al., 1989). The PES and LIC assessments have frequently been used in clinical psychology, and specifically with college students (MacPhillamy & Lewinsohn, 1982, Rosenthal et al., 1989), but the PES has also been

used to assess preference in those who use substances (e.g., Rogers et al., 2008). The PAL is a hybrid of the PES and LIC and was first trialed in the substance use population (Roozen et al., 2008). However, these assessments for identifying preferred community or leisure activities have not been widely reported on in the CRA literature reviewed.

Preference assessments to identify preferred items that may function as reinforcers have frequently been utilized and studied with individuals diagnosed with disabilities (Cannella et al, 2005; Lancioni et al., 1996; Tullis et al., 2011) and their use dates back to the 1960's when participants were simply asked what type of item they preferred (Witryol & Fischer, 1960); however, the formal use of preference assessments is infrequently practiced with the typically developing adult population (Wine et al., 2014). One area of behavioral science that does implement these types of preference assessments is organizational behavior management (OBM) (Henley et al., 2016). Some common methods of preference assessment utilized in OBM include paired choice and multiple stimulus without replacement (MSWO) preference assessments, and surveys using rating or ranking of preferred items (Fisher et al, 1992; Waldvogel & Dixon, 2008; Wine et al., 2014). The MSWO assessment was developed by Deleon and Iwata (1996) and involves the presentation of an array of stimuli from which the individual chooses one item. Once an item is selected the item it is not made available during the next presentation of stimuli from which the individual chooses again. The process of removing an item after selection and allowing the individual to choose again is continued until all the items have been selected or a criterion is reached where an item was selected on a certain high percentage of opportunities (Deleon & Iwata, 1996). The order of item selection indicates the order of preference, with the first item selected during the most trials being identified as most preferred (Deleon & Iwata, 1996).

The paired choice preference assessment is similar to basic concurrent operant experiments conducted with animals in the 1960s (Catania, 1963; Herrnstein, 1970) and was originally developed as a modification to Pace et al. (1985) single stimulus preference assessment by Mason et al. (1989) and Fisher et al. (1992) to more effectively assess preference in children with developmental disabilities. Paired choice preference assessments involve the systematic pairing and alternating of choice options among pairs of stimuli provided to participants and observing the participant's choice (Fisher et al., 1992; Lill et al., 2021). Paired choice preference assessments can be used to generate a hierarchy of preferred stimuli (Lill et al., 2021) and have been used to assess preference for clinical privileges in a methadone clinic (Schmitz et al., 1994).

Rating and ranking preference assessments have also been used to determine preference hierarchies are commonly used in OBM (e.g., Wine et al., 2014). A prevailing rating method that was developed and popularized by Daniels (1989) included a scale ranging from 0-4 with 0 indicating low preference for and low desire to work for an item and 4 indicating a high preference and willingness to work for the item. The identification of potential reinforcers by those who will be engaging in contingencies to obtain them is important. Studies have shown that managers and staff working with clients do not accurately predict preferred reinforcers of their employees or clients (Houlihan et al., 1992; Wilder et al., 2011). The provision of choice, identification of preferred items, and subsequent utilization of preferred items during intervention can result in increases in desired target behavior (Fisher, 1992). Although reinforcer potency is not always synonymous with preferred items or activities, frequently, preferred items or activities also have high reinforcer potency (Roscoe et al, 1999).

In addition to item value being measured by preference, value can also be measured by the rate of behavior sustained over time (Odum, 2011), quantifying the item as a reinforcer if the behavior increases following item presentation. Higher rates of behavior typically occur when there is an immediate consequence compared to a delayed consequence and immediate rewards are frequently preferred over delayed rewards (Odum, 2011). However, the delay to reinforcement as well as the amount of work to obtain a reinforcer can affect reinforcer value (Phung et al., 2019). The tendency for longer temporal delays to devalue reinforcement and the preference for delivery of less reinforcement sooner can be examined through delay discounting (DD) procedures (Odum, 2011; Phung et al., 2019). The term *impulsivity* is frequently used to describe the preference for delivery of less reinforcement sooner (Bickel et al., 1999), and SUD can be viewed as a problem of impulsivity where the immediate reinforcement provided by drug use is preferred over delayed or long-term benefits of abstinence (Yoon & Higgins, 2008).

Delay discounting as a process involves the devaluation of an outcome as a result of a temporal delay (Bickel et al., 2014). When assessing preference for smaller sooner rewards or larger delayed rewards the relationship between the reinforcer's value and the delay to its receipt can be assessed using the following formula developed by Mazur (1987).

$$V = \frac{A}{1 + kD} \qquad (1)$$

Here, V represents the current value of the delayed reinforcer, A is the amount of reinforcer, D indicates the length of delay to receive reinforcement and k is a free parameter for the rate of discounting (Koffarnus & Bickel, 2014; Mazur, 1987; Myerson & Green, 1995; Reed et al., 2020). The parameter k can represent the level of impulsivity in responding with higher k values indicating greater discounting and greater impulsivity (Yoon & Higgins, 2008), therefore, DD can be used to measure impulsivity (Moody et al., 2014). To assess DD and impulsivity,

individuals typically repeatedly choose between receiving smaller rewards (or a portion of the reward) immediately and larger rewards later (Koffarnus & Bickel, 2014). Mischel and Ebbesen (1970) were the first to assess delay gratification in humans for a pair of reinforcers across varying reinforcer magnitudes and delays.

A hypothetical discounting assessment was later developed by Rachlin et al. (1991) where individuals were given numerous choices between smaller monetary amounts sooner and larger amounts later. Hypothetical discounting models such as the Monetary Choice Questionnaire (MCQ) (Kirby et al., 1999; Kirby & Maraković, 1996), and Probability Discounting Questionnaire (PDQ) (Madden, Petry & Johnson, 2009) have since been developed to decrease the time required to complete delay discounting assessments (Reed et al., 2020). Du et al. (2002) made a further modification to the hypothetical discounting assessment (Rachlin et al., 1991) by titrating questions based on previous choices participants made for monetary amounts across different delays. Each of these models can be used to generate indifference points that when graphed fit the hyperbolic formula (Mazur, 1987) by varying either the amount of the reinforcer or the delay to receiving the reinforcer (Yoon & Higgins, 2008). Indifference points are the amount that an individual switches responding from the larger later reward to the immediate or sooner smaller reward (Odum, 2011).

The 5-trial adjusting delay streamlined hypothetical discounting tasks using only 5 choices that are titrated based on the participant's response (Koffarnus & Bickel, 2014). In addition to requiring minimal time to complete (Koffarnus & Bickel, 2014) it can also be adapted to assess discounting of non-monetary commodities (Jarmolowicz et al., 2020; Johnson & Bruner, 2012; Odum et al, 2002; Petry, 2003). Rather than measuring k (Mazur, 1987), area under the curve (Myerson et al., 2001), or area over the curve (Odum et al., 2020), the 5-trial

adjusting delay task measures Effective Delay 50% (ED50), as it can easily be adapted for any amount of any commodity (Koffarnus & Bickel, 2014). ED50 uses the same model as dose-effect curves in pharmacology that depict the correspondence between concentration of the drug at the receptor and the drug response. ED50 in pharmacology refers to the dose of drug required to reach 50% of the maximum drug effect and has been adapted into delay discounting literature to indicate the delay that produces discounting of the reinforcer by 50% and is governed by the following formula (a).

$$ED50 = \frac{1}{k} \tag{2}$$

To obtain ED50 the 5-trial adjusting delay task provides a series of choices between 50% of a given commodity immediately and the full amount of the commodity after a delay. The commodity amount remains constant while the delay is titrated over the 5 choice trials to obtain one of 32 potential ED50 values that can easily be converted to k values and used for comparison across participants or commodities (Koffarnus & Bickel, 2014).

Greater discounting of delayed rewards has been observed in individuals with addiction disorders (Kirby et al., 1999; Moody et al., 2016; Reilly et al., 2000) and is suggested to be a behavioral marker of addiction (Bickel et al., 2014; Moody et al., 2016). Individuals who use substances may also state they prefer employment or interactions with friends and family yet, when provided with the option to use substances, frequently exhibit loss of control and choose the immediate reinforcement provided by substances instead of engaging with friends and family or attending work (Bickel & Marsch, 2001). Those who engage in substance use have also been shown to discount their preferred substance more than money (Kirby et al., 1999; Patel et al., 2020), health (Odum et al., 2002; Petry, 2003), and freedom (Petry, 2003). Therefore, the determination of commodities or community activities that are discounted similarly to an

individual's substance of choice could be useful in treatment. Preference assessments of community reinforcers that are available in community reinforcement programs could determine which community reinforcers may be more potent reinforcers and, perhaps, which are discounted less by individuals.

The current study aimed to first identify which community reinforcers are currently being used in CRA and then assess preference for these activities using rating and ranking among individuals identifying as people who engage in substance use. Additionally, delay discounting of individual's most and least preferred activities was explored as a novel method for assessing if preference affects the amount an activity is discounted. The term community reinforcers will be used in a broad sense, rather than a functional sense, to align with the use of the term within CRA, as the present study did not include a direct test of the reinforcing effectiveness of the community "reinforcers" used in this study.

Method

Participants, Setting, and Materials

Participants were recruited by various methods, including through flyers that were posted at safe injection sites or treatment facilities and were emailed to contacts on a listserv and posted on community sites (e.g., CraigsList, kijiji) (Appendix A). Social media advertising including Facebook, Instagram and Reddit was also utilized to recruit participants.

To be included in the study, individuals were required to self-identify as being over the age of 18 and residing in Canada or the United States. Individuals must also have self-identified as using substances either currently or previously in their life-time, consented to participate, and were recorded as having "finished" the survey in Qualtrics (Appendix B).

Individuals whose responses had nonsensical text entries such as "*Oh I trees and the moon is that you have to do that I*" were excluded from both the CRA preference analysis and the DD analysis. Text entries with spelling or grammatical errors were not excluded. Individuals who completed only a portion of the DD section were excluded from the DD analysis. Additionally, individuals with consistency scores on the abbreviated MCQ below 60% were excluded. Scores below 60% are in line with random responses to questions. Although a consistency score cut off of 75% is often suggested (Gray et al., 2016; Reed et al., 2020), a lower cut off score was used given this study was exploratory and no significant differences resulted from inclusion of participants with lower consistency scores.

A total of 223 participants initiated the survey and out of those 111 participants were recorded as having "finished" the survey in Qualtrics, with 108 choosing to participate and 3 choosing not to participate. The inclusion and exclusion criteria were applied to these 108 participants; 97 participants had consistency scores higher than 60% and completed the preference assessment portion of the survey and 73 participants had consistency scores higher than 60% and completed the delay discounting and MCQ portion of the study.

Of the 97 participants who chose to complete the survey, Table 1 displays demographic information. 57 (58.8%) participants identified as woman, with 15 (26.3%) residing in Canada, 7 (7.2%) between 18-35 years of age and 8 (8.2%) over 36 years of age, and 42 (73.7%) residing in the United States (US), 20 (20.6%) between 18-35 and 22 (22.7%). A total of 33 (34.0%) participants identified as man, with 20 (60.6%) residing in Canada with 10 (10.3%) between 18-35 and 10 (10.5%) over 36 years of age, and 13 (39.4%) residing in the US with 6 (6.2%) aged 18-35 and 7 (7.2%) over 36. Additionally, 6 (6.2%) participants identified as non-binary with 4 (4.1%) residing in Canada between the ages of 18-35 and 2 (2.1%) residing in the US with 1

(1.0%) aged 18-35 and 1 (1.0%) over 36, and 1 (1%) participant identified as transgender between the ages of 18-35 and residing in Canada.

Dependent and Independent Variables

The dependent variables included preference for and delay discounting of community reinforcers, and delay discounting of medium value monetary amounts. Preference was measured in two different ways: first, by rating of reinforcers on a 5-point Likert scale and second, by ranking of reinforcers on a 12-point (hierarchical) scale. Delay discounting of the highest and lowest ranked community reinforcer and hypothetical monetary values were measured using ED_{50} and the inverse, k was then transformed using a natural logarithm (Koffarnus & Bickel, 2014). More details are provided below. Independent variables were the community activity options, including attending social clubs, attending concerts, meals at a restaurant, going to the movies, bowling, hiking, attending self-help groups, attending sporting events, playing games on a sports team, activities with family or friends, exercise, and reading. Community activities included labels only as they were generated by individuals implementing CRA and definitions were not provided. Additional independent variables included participants substance use history and the amount of community reinforcer they equated to $100 as well as hypothetical monetary values used in the abbreviated Monetary Choice Questionnaire.

Procedure

A Qualtrics survey administered to CRA treatment providers and clinicians enrolled in a Listserv was used to identify activities currently being used in CRA (Appendix C). A second Qualtrics survey was used collect data and contained the following sections: participant demographics, substance use, preference assessments, delay discounting assessment, and abbreviated Monetary Choice Questionnaire (MCQ) (Appendix B).

Substance Use. Participant's substance use history was assessed via an abbreviated

NIDA-Modified ASSIST (National Institute on Drug Abuse, 2018) where individuals were asked

what types of substances out of the list provided that they had previously or currently use and

how frequently. The frequency of use ranged from: daily, weekly, monthly, once or twice,

previously but not in the last 3 months, never used, and prefer not to say. The substances

included alcohol, cannabis, hallucinogens, sedatives, inhalants, methamphetamine, stimulants,

cocaine, and opioids. Participants were provided with the following instructions:

> What types of substances do you currently (i.e., in the last three months) or
> have you previously used for recreational purposes?

Participant substance use profile can be seen in Figure 1.

Community Preference Assessment. A list of twelve community activities for the

preference assessment was generated by sending out a short Qualtrics survey with open ended

questions to a Listserv (Appendix C). The questions asked individuals to identify community

reinforcers that were currently being used, or had been used in treatment for substance use

disorder. All community reinforcers identified in the survey were included in the preference

assessment (Table 2).

The preference assessment consisted of modified version of the stimulus preference

procedures used by Wine et al. (2014) in experiment one that included a both stimulus rating and

ranking. Participants were first asked to rate their willingness to engage in each of the 12

previously identified community reinforcers on a scale of 0-4, as used in Wine, et al. (2014),

with slightly modified wording: 0 *(not at all)*, 1 *(a little),* 2 *(a fair amount)*, 3 *(willing)*, to 4 *(very*

willing). Participants were provided with the following instructions:

> On a scale of 0-4 from NOT AT ALL WILLING (0) to engage in to maintain
> abstinence and VERY WILLING (4) to engage in to maintain abstinence,
> please rate the following activities.

Per the scoring criteria used by Wine et al. (2014), activities scoring 3 or 4 were considered high-preference activities. The next question asked participants to rank the same 12 activities from 1-12, with 1 indicating the respondent was most likely to engage in that activity to maintain abstinence and 12 indicating the respondent was least likely to engage in that activity to maintain abstinence. Participants were provided the following instructions:

> Rank the following activities from MOST (1) likely to engage in to maintain abstinence to LEAST (12) likely to engage in.
> *Drag and drop to reorder the activities*

Delay Discounting. Participants were asked what amount of their lowest ranked (#1-most likely to engage in to maintain abstinence) activity and what amount of their highest ranked (#12- least likely to engage in to maintain abstinence) activity equated to $100 (Phung et al., 2019). The question prompted participants to select a number greater than or equal to two and less than or equal to 100 to simplify calculations. Participants were given the following instructions:

> What amount of *(#1 ranked reinforcer)* do you think is equal to $100?
> *(Please enter a number between 2 and 100)*

> What amount of *(#12 ranked reinforcer)* do you think is equal to $100?
> *(Please enter a number between 2 and 100)*

The amounts participants reported were then used as values for a 5-trial adjusted delay discounting task (Koffarnus & Bickel, 2014) for both the #1 and #12 ranked community reinforcer. The equated amount was used as the larger later amount, and 50% of that amount was used for the sooner smaller amount (Du et al., 2002). Participants were provided with the information below prior to each choice option.

> The following questions will ask you to choose which of two activities you prefer in a setting previous to the pandemic. For each activity, assume that travel to and from any event is provided and the cost of the event has been covered. You will not participate in the activities that you choose, but we want you to

make your decisions as though you were really going to participate in the
activities you select. The choices you make are completely up to you, please
select the option that you prefer. There is no right or wrong answer. You are not
expected to choose one particular activity over another. Just choose the activity
that you really want.

The question titration and associated k values were the same as those used by Koffarnus and

Bickel (2014) which provided options of either 50% of the amount now or the full amount after a

delay and can be seen in Figure 2. The natural logarithm (ln) of k was then calculated.

Abbreviated Monetary Choice Questionnaire. The MCQ 9-item medium value subset

(Kirby et al., 1999; Shenhav et al. 2017) was used to assess logical responding in participants.

Discounting across subsections of varying reward magnitudes in the full MCQ-27 item are

highly consistent (Amlung & MacKillop, 2011), so a subset of the full MCQ-27 item was used to

keep surveys short and reduce participant burden. The MCQ 9-item medium subset uses the 9

questions with medium values from the MCQ 27-item that ranged from $50-$60 (Towe et al.,

2015). The k value and corresponding consistency scores were calculated using the Excel based

MCQ scoring tool developed by Kaplan et al. (2014) and described in Kaplan et al. (2016). The

natural logarithm of k was then calculated.

Results

Participant Substance Use History and Frequency of Use

Across participants a wide range of substances were endorsed in varying degrees. Figure

1 lists the substances included in the assessment as a function of the percentage of individuals

who endorsed use of that substance and the frequency of substance use. Frequencies of use are

indicated by colored horizontal bars, with daily use depicted in dark red, weekly use shown in

orange, monthly use shown as gold, one-two times in a lifetime displayed in light yellow,

previously (not within the last three months) shown in blue, never used in light grey and prefer

not to answer depicted in dark grey. Alcohol was endorsed most across all frequencies whereas

cannabis was the most endorsed for daily use followed by opioids and sedatives respectively

(Figure 1). Having the highest amounts of endorsement for alcohol is consistent with the

reported frequency of use of these substance as 139.7 million individuals in the US in 2019

reported consuming alcohol in the previous month and 71% of individual with a substance use

disorder have alcohol use disorder. 31.6 million individuals reported cannabis use in the previous

month in 2019 and approximately 40% of individuals who use substances were reported illicit

drugs use disorder (SAMHSA, 2020).

Community Reinforcer Identification

A total of 12 different community reinforcers were identified through the first Qualtrics

survey distributed via a listserv (Appendix C) and included attending social clubs, attending

concerts, meals at a restaurant, going to the movies, bowling, hiking, attending self-help groups,

attending sporting events, playing games on a sports team, activities with family or friends,

exercise, and reading (Table 2). Of these 12 activities, concerts, social clubs, self-help groups,

and exercise were identified as being used in treatment programs by two different participants.

Treatment programs using these reinforcers were located in the US, Netherlands and Canada.

Additionally, 67% of participants indicated that community reinforcers available to clients in

treatment programs were not client specific but rather were available to all individuals.

Of the 12 activities that were identified as currently in use, 11 displayed some overlap

between those listed in the PES, PAL and LIC. Attending a self-help group, however, was not

mentioned in the PES, PAL or LIC (Table 2).

Preference Assessments

The frequency of each community activity rated as highly willing or not willing to engage in to maintain abstinence compared to other listed activities as well as activities ranked #1 and #12 are depicted in Table 3. The total number of participants who ranked each activity are displayed in Table 2 along with the relative percentage of the total sample size below in brackets. Preference assessments identified the highest most frequently ranked community reinforcers (#1) as activities with family or friends with 14.4% of participants ranking it highest, and attending self-help groups, with 13.4% of participants ranking it highest (Table 3). However, the rating preference assessment identified hikes and reading as activities participants were highly willing to maintain abstinence for with 54.9% rating hikes as 3 *(willing)*, 4 *(very willing)*, or higher than the other community activities listed and 53.7% rating reading as 3 *(willing)*, 4 *(very willing)*, or higher than the other community activities listed (Table 4).

The lowest ranked community reinforcers (#12) were reading with 22.7% of participants ranking it lowest, and playing games on a sports team, with 15.5% of participants ranking lowest (Table 2). In contrast, the rating assessment identified attending social clubs as the activity participants were most unwilling to engage in to maintain abstinence, with 43.9% rating attending social clubs as 0 *(not at all willing)* or lower than the other community activities listed. The 12-point ranking assessment also identified attending social clubs as less likely to engage in with 13.4% of participants ranking it #12, but it was not indicated as the least likely to engage in to maintain abstinence. There was correspondence between the rating and ranking assessments for games played on a sports team as it obtained a low rating from 37.8% of participants and was ranked as #12 by 15.5% of participants making it the second least preferred community activity (Table 4).

This low correspondence between rating and ranking preference assessments is also evident at the individual participant level. Figure 7 shows the individual rating score for each community reinforcer as a function of its ranking score for that reinforcer for each participant. Individual graphs were used to determine the extent to which high ratings of 3-4 were given to activities with rankings of 1-3, and low ratings were given to activities with rankings 9-12, similar to findings in Wine et al. (2014). When rating and ranking scores corresponded, data points were highest in the top left quadrant of the graph and lowest in bottom right quadrant of the graph, as seen in participants 1029 and 1065. Rating and ranking scores that did not correspond were depicted by an opposite pattern, where data points were lowest in the bottom left quadrant and highest in the upper right quadrant as seen in participant 1107. Data patterns like those of participant 1107 indicated that the participant ranked a community reinforcer as least likely to engage in but rated the same reinforcer as very willing to maintain abstinence for. Opposite ranking and ratings could be due to the participant not attending to the instructions in the ranking section and continuing to place activities that were likely to maintain abstinence at the high end of the ranking scale as they had in the rating section. Unlike findings by Wine et al. (2014), the correlations between rating and ranking were not high for most participants.

The majority of participants had high variability between their rating and ranking of community reinforcers leading to low correlations (Figure 7). Examples of extreme variability can be seen in participants 1055 and 1105. Some activities had correlations between their ranking and rating and others were ranked as more likely to engage in to maintain abstinence (1-6) but rated as only a little willing to engage in to maintain abstinence (1). The low correspondence and high variability across ratings and rankings could be due to differences in participants who completed the assessment, as Wine et al. (2014) conducted their assessment in

an OBM setting with three participants and the current study assessed 97 individuals who use substances. The high variability seen across many of the participants could also be due to the commodities being assessed on different scales. Ratings examine each commodity individually, whereas ranking compares commodities and forces distribution (Wine et al., 2014). An attention check to confirm participant's rankings were as they intended may also have assisted in decreasing variability and increasing rating and ranking correlations. However, the use of both assessments was beneficial for participants such as 1085, 1087 and 1088, who rated all reinforcers as being equally as likely to engage in to maintain abstinence. High ratings across multiple community reinforcers are an artifact of the scoring method used in the rating survey (Wine et al., 2014). If only a rating preference had been conducted with these participants, a preferred community reinforcer may not have been identified.

Delay Discounting

Figure 4 depicts the natural logarithm of the k values associated with the #1 ranked community reinforcer and the #12 ranked reinforcer in before-after columns to assess the difference in ln$k$ between participant's #1 ranked and #12 ranked reinforcer. The darker the data points and connecting lines, the higher the degree of overlap between participant ln$k$ values. Three main slope patterns were present in this data set and functions with ascending slopes were separated from descending and zero slopes to better visualize the data in Figure 5. The same graphing conventions were used for both Figures 4 and 5.

The ascending slopes indicate relative increases in ln$k$ values between the #1 ranked community reinforcer and the #12 ranked community reinforcer, which correspond to participants who discounted their #12 ranked more than their #1. Descending slopes indicated participants responded more impulsively to their #1 ranked community reinforcer than their

number 12 ranked community reinforcer. Zero slopes showed no relative change in ln$k$ between

participants' #1 and #12 ranked community reinforcers. Over 50% of participants had relative

changes in ln$k$ of lower than 5 (Figure 6). Relative change scores below 5 indicated that the

participants discounted both their #1 and #12 ranked community reinforcers fairly equally.

Similar delay discounting of preferred and non-preferred community reinforcers aligns with

previous studies that found that people who use substances tended to be highly impulsive and

exhibit greater delay discounting for various commodities compared to people who do not

engage in substance use (Kirby et al., 1999; Moody et al., 2016; Reilly et al., 2000).

MCQ

Figure 8 displays the median ln$k$ values for the #1 and #12 ranked and the MCQ. The ln$k$

values for #1 ranked activities are indicated by circles, the #12 ranked activities by squares and

the MCQ values by triangles. The median values are indicated by black horizontal lines. The

darker data points indicate larger degrees of overlap between ln$k$ values and the light grey

indicate little to no overlap. When comparing the median ln$k$ of the #1 and #12 ranked

reinforcers to median MCQ ln$k$ the monetary amounts were discounted at a lower rate than the

community reinforcer (Figure 8). Individuals who engaged in substance use displayed greater

discounting of nonmonetary commodities compared to monetary amounts is consistent with the

results of previous discounting assessments in this population (Kirby et al, 1999; Petry, 2003).

Using the same calculation as Odum et al. (2020), k proportions between the average k value of

each #1 and #12 ranked activity and average MCQ k values were obtained. The average k value

across participants who ranked community reinforcer #1 and #12 were divided by the average

reinforcer k value and the average abbreviated MCQ k value. Proportions greater than 0.5

indicate that the community reinforcer was discounted to a larger degree than the monetary

outcome, whereas proportions less than 0.5 indicate the community reinforcer was discounted to a lesser degree than the monetary outcome. (Odum et al., 2020). The majority of k proportions for community reinforcers were either very close to 1 or 0, with most falling around 1 (Figure 9). This higher degree of discounting of activities compared to monetary outcomes is similar to how food was discounted in Odum et al. (2006) and Charlton and Fantino (2008). However, unlike the k proportions reported by Odum et al. (2020), community reinforcers also had proportions close to 0, which was observed in other studies also reported by Odum et al. (2020).

Discussion

The establishment of a list of community reinforcers that are frequently implemented in current CRA for substance use treatment is an important contribution to CRA literature. Literature that has identified social or leisure activities for clients to access have mostly been specific to opioid treatment clinics, assessments were conducted with individuals receiving pharmacotherapy, and the literature is somewhat dated (Amass et al., 1996; Chutuape et al., 1998; Stitzer & Bigelow, 1978; Schmitz et al, 1994). With respect to the PES, PAL and LIC, their use for determining potential reinforcers during the study of CRA has not frequently been indicated in CRA literature (MacPhillamy & Lewinsohn, 1982; Roozen et al., 2008; Dijkstra & Roozen, 2012). Although CRA is easily individualized to meet each client's needs (Kraan et al., 2018), documentation of community activities that are currently being used allows for further assessment of these activities and which ones may be more widely accepted or more effective at maintaining abstinence. Listing specific community activities that are being used in CRA also provides a starting point for determining activities to make available to clients at treatment centers that are considering providing CRA.

Assessments have previously been conducted with individuals who use substances to examine their preference for the schedule of reinforcement provided for CM, immediate versus delayed distribution of reinforcers, and fixed versus variable ratio schedules of reinforcement. The assessment of schedule and delay to reinforcement showed a preference for fixed rather than variable schedules and preference of delayed rewards versus immediate rewards (Hartzler & Garrett, 2016). The preference for fixed schedules is consistent with voucher-based CM, as reinforcement is predictable in this model (Rash & DePhilippis, 2019). The preference of delayed-reward appears to be dichotomous with findings that immediacy of reinforcement after a target behavior promotes the link between the behavior and its consequence (Lussier et al., 2006). However, voucher-based CM could also be conceptualized as providing delayed reinforcement, as the participant must wait to spend or use the voucher after receiving it. Therefore, the provision of vouchers allows immediate conditioned reinforcement after abstinence from substance use is confirmed as well as delayed reinforcement as the participant can wait and save up vouchers to spend later (Higgins et al., 2007).

Additionally, assessments have been used to identify preferred clinic privileges in methadone clinics, vouchers, and some social activities (Amass et al., 1996; Chutuape et al., 1998; Stitzer & Bigelow, 1978; Schmitz et al, 1994), however, formal preference assessments across community reinforcers to be used in CRA for substance abuse and how these activities are discounted over time has not been explicitly documented in the literature to date. Identification of preferred stimuli through preference assessments has been shown to be a good predictor of reinforcers (Lill et al., 2021; Pace et al., 1985), and reinforcer effectiveness has been positively correlated with preference (DeLeon et al., 2009; Lee et al., 2010). Allowing individuals to complete a preference assessment for community reinforcers may not only identify activities an

individual prefers and would be more likely to engage in, but could also be used to identify activities that would compete with substance use. Preference assessments have been used to identify stimuli that compete with pica, maintained by automatic and social reinforcement (Piazza et al., 1998), as well as identify items to include in an enriched environment to treat hand mouthing and self-injurious behavior, that did not have a clearly identifiable function (Vollmer et al., 1994).

The use of the preferred stimuli in treatment has increased the efficacy of reinforcement-based interventions (Lill et al., 2021; Piazza et al., 1998; Vollmer et al., 1994). Given that CRA is a reinforcement-based treatment, the inclusion of preference assessments may increase the efficacy of the intervention. Across participants there was not a clear differentiation of preference for one specific reinforcer but activities with family, attending self-help groups and exercise were frequently highly ranked. With respect to the less preferred activities, there was clear differentiation with reading being most frequently ranked the lowest. The lack of differentiation in preference across participants for highly preferred reinforcers but clear distinction of a least preferred activity is similar to results reported by Schmitz et al. (1994), where three available reinforcers were most highly ranked and one was clearly less preferred by all participants.

The results of the present study also indicate that the utilization of two types of preference assessments may be beneficial in the clinical setting. Ranking surveys specifically have been successfully used to identify preference for clinic privileges and service items in methadone clinic clientele (Amass et al., 1996; Chutuape et al., 1998) as have paired stimulus assessments that have been converted to interval ranking scales (Schmitz et al., 1994), but the use of both rating and ranking survey assessments to identify preferences of people who use

substances was not reported in the literature reviewed. Unlike results from Wine et al. (2014), the rating and ranking of community reinforcers did not correspond for all participants and some participants stated they were very willing to engage in all of the reinforcers listed in the rating section. The inclusion of both the ranking and rating preference assessments facilitated the identification of which reinforcers were more preferred than others.

The use of an electronic self-report survey for preference of community reinforcer as used in this study aligns with how many other clinical assessments are distributed to individuals who use substance (Patnode et al., 2020). Highly variable results across rating and ranking of a community reinforcer suggest the inclusion of an in-person review to discuss contextual variables and clarify preferences may be warranted. Combination of self-report surveys and in person interview were also found to be commonly used assessment techniques in Patnode et al.'s (2020) systematic review of assessment methods. Comparisons between the results of rating and ranking surveys delivered electronically without follow up for clarification from a clinician and those that included a review and clarification follow up should be explored to determine an optimal format for conducting preference assessments of community reinforcers.

In addition to in-person interviews, experimental investigation of community reinforcers with conflicting preference assessment results could determine if any of the community reinforcers identified will function as reinforcers. Such reinforcer assessments involve the delivery of a stimulus contingent on a specific behavior; if the rate or frequency of the behavior increases as a result of contingent provision of the stimulus, then the stimulus functions as a reinforcer for the behavior (Pace et al., 1985). Although there is high correlation between reinforcer efficacy and individual preference, reinforcer assessments are frequently conducted following preference assessments to confirm that the preferred items do function as reinforcers

(Lee et al., 2010). Future research could explore the use of reinforcer assessments to examine the extent to which there are differences in reinforcing value of community reinforcers identified as highly preferred by participants. Reinforcer assessments can also be conducted without a preference assessment, and are commonly implemented using a progressive-ratio schedule (Hodos, 1961). In a progressive ratio schedule an individual must emit a higher number of responses following each reinforcer delivery until a break point is achieved where the required number of responses are not completed within a specified amount of time (Hodos, 1961; Lee et al., 2010; Roane, 2008) The efficacy of a reinforcer is directly tied to its relative break point compared to the break points of other potential reinforcers, with high break points indicating a potent or effective reinforcer (Roane, 2008).

Breakpoints can also be calculated using behavior economics and progressive ratio schedules or hypothetical work tasks to create demand curves (Henley et al., 2016; Johnson & Bickel, 2006). Demand is the amount of a commodity that is obtained at a given price and demand curves measure the consumption of a commodity as a function of price (Bickel et al., 2014). Demand can be described as elastic when it sensitive to changes in price and inelastic when it is insensitive to price changes. When Demand shifts from elastic to inelastic, peak responding can be identified which is typically followed by the breakpoint. Breakpoint in a demand curve occurs when the price or amount of responses required surpasses consumption (Henley et al., 2016; Hursh & Winger, 1995; Murphy et al., 2011). Demand curves have frequent been employed in the study of substance use, as well as in conjunction with delay discounting assessments (Bickel et al., 2014).

Although demand curves and delay discounting has not been used as an assessment tool for examining impulsivity in community reinforcer selection, behavioral economics and

specifically delay discounting have frequently been used to assess indifference points of substances compared to money (e.g., Jarmolowicz et al., 2020; Kirby et al., 1999; Patel et al. 2020; Petry, 2003; Phung et al., 2019) as well as other commodities (e.g., sex, health, freedom) in comparison to substances (Johnson & Bruner, 2012; Petry, 2003). People who use substances tend to exhibit high levels of impulsivity, favor immediate versus delayed rewards (Bickel et al., 1999; Kirby et al., 1999), and frequently delay discount their substance of choice more steeply than or similar to money and other commodities (Kirby et al., 1999; Phung et al., 2019; Petry, 2003). If commodities that are discounted similarly or less than an individual's substance of choice could be identified, these commodities could be useful in treatment for substance use disorders.

Phung et al. (2019) found that individuals with alcohol use disorder delay discounted money and alcohol equally. However, addiction severity also plays a role in the level of delay discounting and greater addiction severity has been correlated to steeper delay discounting of commodities (Amlung et al., 2017). Individuals with severe alcohol use disorder had greater delay discounting for both money and alcohol, compared to individuals with less severe disorders. Additionally, individuals with severe alcohol use disorders displayed lower effort discounting or a greater willingness to work for alcohol as a reward than to work for money (Phung et al., 2019). A combination of preference assessments for commodities such as community reinforcers and subsequent delay discounting of those commodities compared to substances or money as explored in this study, may function to identify potential reinforcers to maintain abstinence in substance use treatments. Further research regarding preference for community reinforcers in people who use substances is warranted, as is exploration into the use

of delay discounting as a measure to assess for likelihood of a community reinforcer maintaining abstinence.

Various limitations of the present study warrant mention. Prior to discussing the limitations, it is important place the study in the appropriate context within which its findings should be interpreted. Like many studies venturing into largely unexplored areas, this study primarily serves a descriptive purpose. More specifically, it describes the utility of preference assessments and delay discounting to examine the potential effectiveness of community reinforcers provided in treatment for substance use. The science of behavior, like most natural sciences, progress from description to prediction to control (Moore, 2010). Description serves an important role in that it allows the generation of hypotheses regarding causation that can later be explored in analytical studies (Grimes & Schulz, 2002). Identification and description of behavioral phenomena can lead to further assessment of reinforcers maintaining responding and functional relationships between these reinforcers and the responses that produce them (Moore, 2010).

With the purpose of the study in mind, the limitations identify several important areas for improvement for future studies. The relative sample size of participants was too small to allow analysis of difference in community reinforcer preference-based identity, location of residence and age. Analysis of frequency of substance use and type of substance use and the effect on reinforcer preference and DD of community activities was also not able to be assessed due to the relatively small sample size of each demographic.

In addition, the accuracy with which the participants reported the substance use history was not verifiable which could lead to erroneous results and interpretations. Future studies should endeavor to have a larger sample size to allow additional analysis of the effect of

demographic and substance use history on preference and delay discounting, and to the greatest extent possible, verify the substance use history of participants.

Also, the wording used in the preference assessments and delayed discounting measures may have been unclear to participants, leading to inaccurate answering of the questions asked and limiting the applicability of the results. When asked discounting questions regarding their #12 ranked activity, participants may have selected longer delays in order prolong having to engage in the lowest ranked community activity. When problem behaviors are maintained by the continued deferral of an aversive stimulus such as social or community interactions, they are considered to be escape maintained (Harper et al., 2013). In participants who had continued selection of larger delays for the #12 ranked community reinforcer further assessment to the function of this behavior is warranted to determine if it is indeed to escape engaging in the community reinforcer activity. Methodological examination of question wording could increase confidence in the validity of the results obtained.

Further, the units of measurements of community activities in "amount" was arbitrary and did not include a specific definition with regards to how many instances or occurrences of each activity or the time spent for each activity. Using a more robust definition of amount that either specifies number of occurrences or time spent could facilitate more accurate delay discounting. Fifth, as mentioned previously, the absence of attention checks throughout the survey poses a limitation of the reliability of participant responses. The addition of a clarifying question after the ranking section that confirms the participant was most likely to engage in the #1 ranked activity to maintain abstinence and least likely to engage in the #12 to maintain abstinence may have eliminated or at least decreased possible confounds in the delay discounting outcomes.

Another limitation was the final titration of the one branch of the 5-trial adjusted delay discounting task for the #1 ranked community activity (see question #17 in Appendix C) included a duplicate delay of 1 hour instead of 3 hours. Given that this was a final choice point, the selection determined the k value for that community reinforcer. Two options existed for assignment of a k value: (1) the k values associated with choice points of "now" and "3 hours" could have been used under the assumption that if the participant selected the "now" option when given the choice between ½ of the amount now and all of the amount in 1 hour, that they would have selected the now option if given the same choice but with a delay of 3 hours, or (2) using the k value associated with the question as it was presented and having duplicate k values for choice points 16 and 17 (see Figure 2). The k value associated with the choice point that the individual saw and answered was used and the exact 5-trial adjusting delay discounting task scores were slightly skewed. The k value for the question as it was presented was used, as a conservative approach and to avoid any assumptions of what the participant may have selected if provided with the correct question. Future research should use an unmodified 5-trial adjusting delay discounting task that incorporates choice points for all k values so delay discounting could be properly assessed.

Finally, as previously mentioned, a limitation with comparison of rating and ranking assessments are the different measurement scales which prevents traditional correlational analyses. Ratings look at each commodity individually, whereas ranking compares commodities and forces distribution. With forced distribution of preferences, multiple highly preferred stimuli may not be identified (Wine et al., 2014).

Provided that this study was descriptive in nature, each area explored preference assessments of community reinforcers and delay discounting of those activities in individuals

who use substances as well as correspondence between the type of substance used or frequency

of use and amount of discounting or preference should be studied further. Each of these areas

would benefit from its own line of research to better understand the relations between substances

and recreational commodities used as reinforcers in substance use treatment. Future studies into

types of preference assessments that have high validity and social acceptability in people who

engage in substance use is warranted. Additionally, future studies could continue exploration of

the 5-trial adjusting delay discounting task and correlation between low delay discounting and

effective reinforcers. Studies on variables such as frequency and severity of substance use in

addition to the type of substance being used and its relative half-life may affect preference and

delay discounting would also be important contributions to the current literature. Although

substance use severity does not seem to effect DD of commodities (Robles et al., 2011) it may

have an effect on preference for reinforcers or activities. Exploration into these areas could

contribute to effective methods of assessing reinforcers for use in substance abuse treatment.

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Table 1

Participant Demographics

Identity	Canada		Sub-Total	US		Sub-Total	Grand Total
	18-35	36+		18-35	36+		
woman	7	8	15	20	22	42	57
man	10	10	20	6	7	13	33
non-binary	4		4	1	1	2	6
transgender	1		1				1
	22	18	40	27	30	57	97

Note. Participant demographics prior to inclusion and exclusion criteria application. Demographic information includes gender identity, age group, and county in which the participants reside. Light grey columns indicate subtotals of participants for each country and the dark grey column denotes the overall total number of participants.

Table 2

Overlap of Identified CRA Reinforcers with PES, LIC and PAL

	PES	LIC	PAL
social club	YES	NO	NO
concerts	YES	YES	YES
restaurant	YES	YES	YES
movies	YES	YES	YES
bowling	YES	NO	YES
hikes	YES	YES	YES
self-help	NO	NO	NO
sporting events	YES	YES	YES
games on a sports team	NO	YES	YES
family or friends	YES	YES*	YES
exercise	YES	YES	NO
reading	YES	YES	YES

Note. The left most column of the table lists the 12 community reinforcers that were indicated as currently used in reinforcement and their inclusion in the PES, LIC, or PAL is indicated with a "YES" or "NO". The * indicates that only friends were mentioned in the LIC and not family.

Table 3

Frequency of Highest and Lowest Ranking for Community Reinforcer

Community Reinforcer	#1	#12
social club	10 (10.3%)	13 (13.4%)
concerts	10 (10.3%)	5 (5.2%)
restaurant	8 (8.2%)	1 (1.0%)
movies	5 (5.2%)	4 (4.1%)
bowling	4 (4.1%)	7 (7.2%)
hikes	10 (10.3%)	1 (1.0%)
self-help	13 (13.4%)	10 (10.3%)
sporting events	2 (2.1%)	5 (5.2%)
games on sports team	1 (1.0%)	15 (15.5%)
family or friends	14 (14.4%)	8 (8.2%)
exercise	12 (12.4%)	6 (6.2%)
reading	8 (8.2%)	22 (22.7%)

Note. Community reinforcers listed in the left most column were identified through a survey of clinicians and practitioners at substance use clinics and treatment centers. The number of participants who ranked each activity as #1 or #12 are shown on the top line and the percent relative to the total number of participants is shown below in brackets.

Table 4

Frequency of High and Low Ratings and Rankings

	Frequency Lowest Rated		Frequency Ranked #12		Frequency Highest Rated		Frequency Ranked #1	
More Preferred	restaurant	13.4%	restaurant	1.0%	hikes	54.9%	family or friends	14.4%
	family or friends	13.4%	hikes	1.0%	reading	53.7%	self-help	13.4%
	reading	17.1%	movies	4.1%	restaurant	48.8%	exercise	12.4%
	movies	20.7%	concerts	5.2%	self-help	43.9%	social club	10.3%
	hikes	23.2%	sporting events	5.2%	family or friends	43.9%	concerts	10.3%
	exercise	23.2%	exercise	6.2%	exercise	42.7%	hikes	10.3%
	self-help	28.0%	bowling	7.2%	games on a sports team	37.8%	restaurant	8.2%
	concerts	32.9%	family or friends	8.2%	movies	35.4%	reading	8.2%
	bowling	36.6%	self-help	10.3%	concerts	31.7%	movies	5.2%
	sporting events	37.8%	social club	13.4%	sporting events	31.7%	bowling	4.1%
	games on a sports team	37.8%	games on a sports team	15.5%	bowling	28.0%	sporting events	2.1%
Less Preferred	social club	43.9%	reading	22.7%	social club	20.7%	games on a sports team	1.0%

Note. Community reinforcers listed in the left side of each column were identified through a survey of clinicians and practitioners at substance use clinics and treatment centers. The percent relative to the total number of participants who rated activities high or low relative to other and ranked activities as #1 or #12 are indicated on the right of each column. The community reinforcers are ordered from most preferred to least preferred in each column.

Figure 1

Participant Substance Use Profile
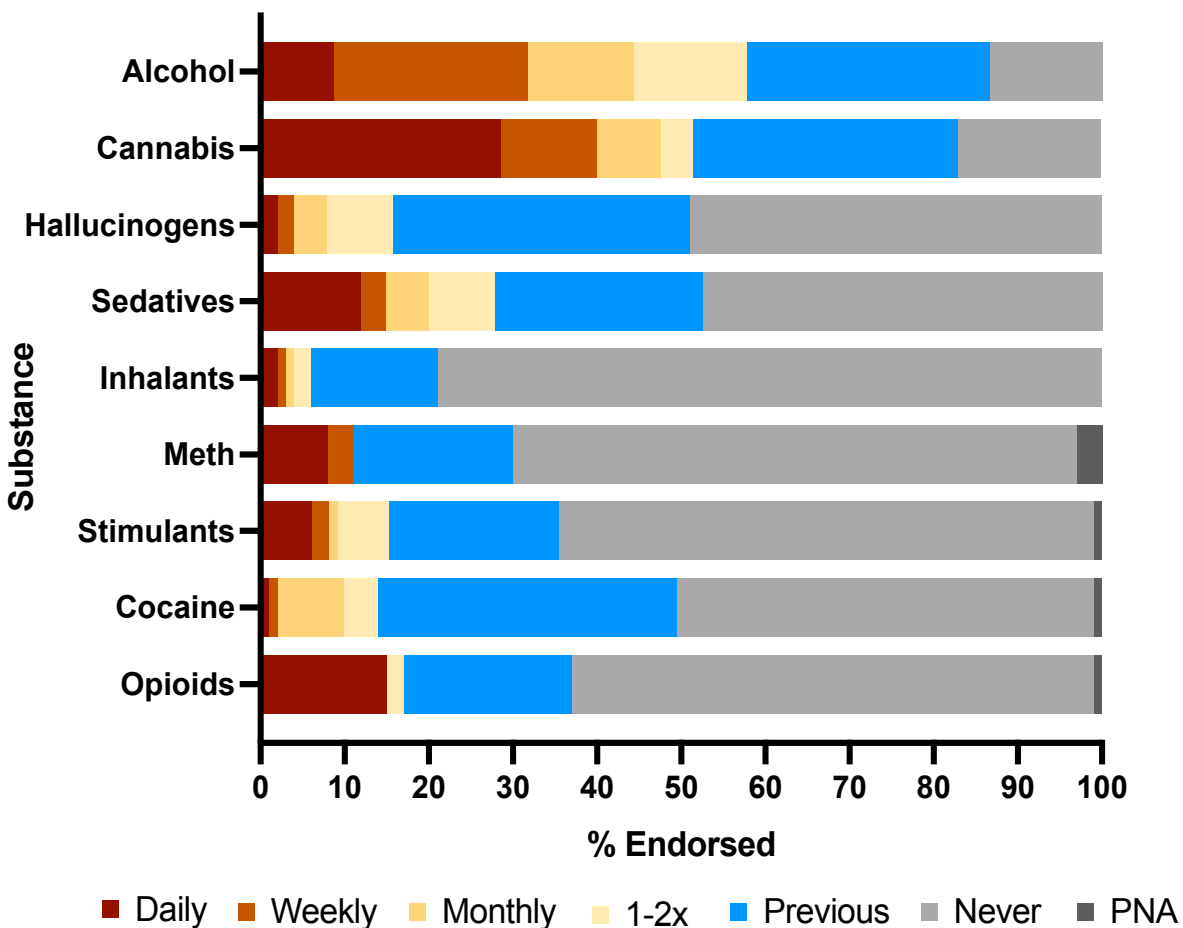
Note. Substance type as a function of frequency of use and percentage of participants (n = 97) that indicated they endorsed the substance. Dark red indicates daily use of the substance, orange depicts weekly use, gold monthly use, light yellow indicates use of the substance once or twice in a lifetime, blue shows previous substance use but not within the last three months, light grey indicates a participant never used a substance and dark grey is prefer not to answer.

Figure 2

Qualtrics 5-Trial Adjusting Delay Discounting Task Branching
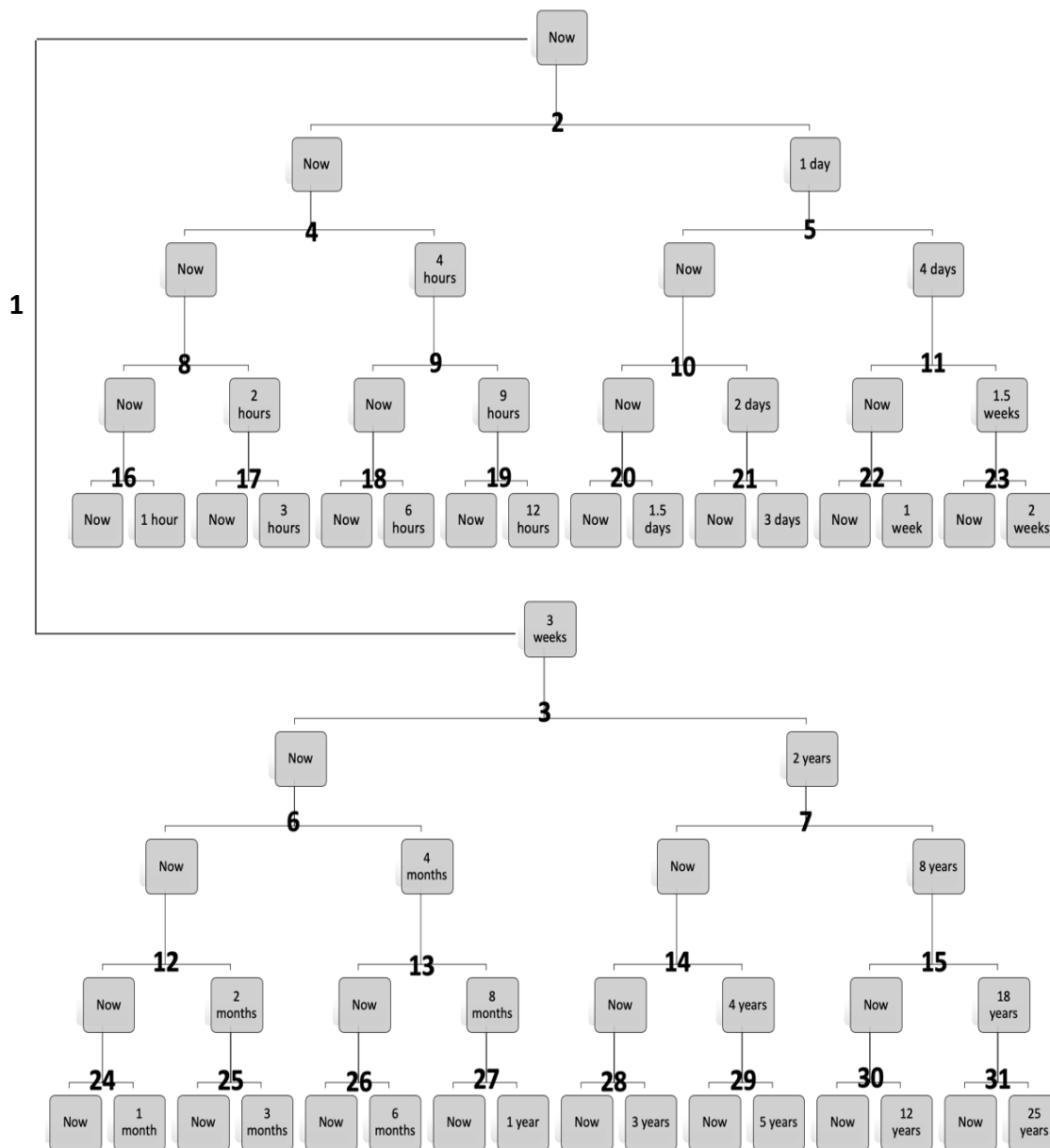
Note. Titration of 5-trial adjusting delay discounting task used for both #1 ranked and #12 ranked community reinforcer. The bold black number indicates the question number in Qualtrics survey and light grey boxes indicate the choice options.

Figure 3

*Mean ln*k *of #1 and #12 Ranked Community Reinforcers*
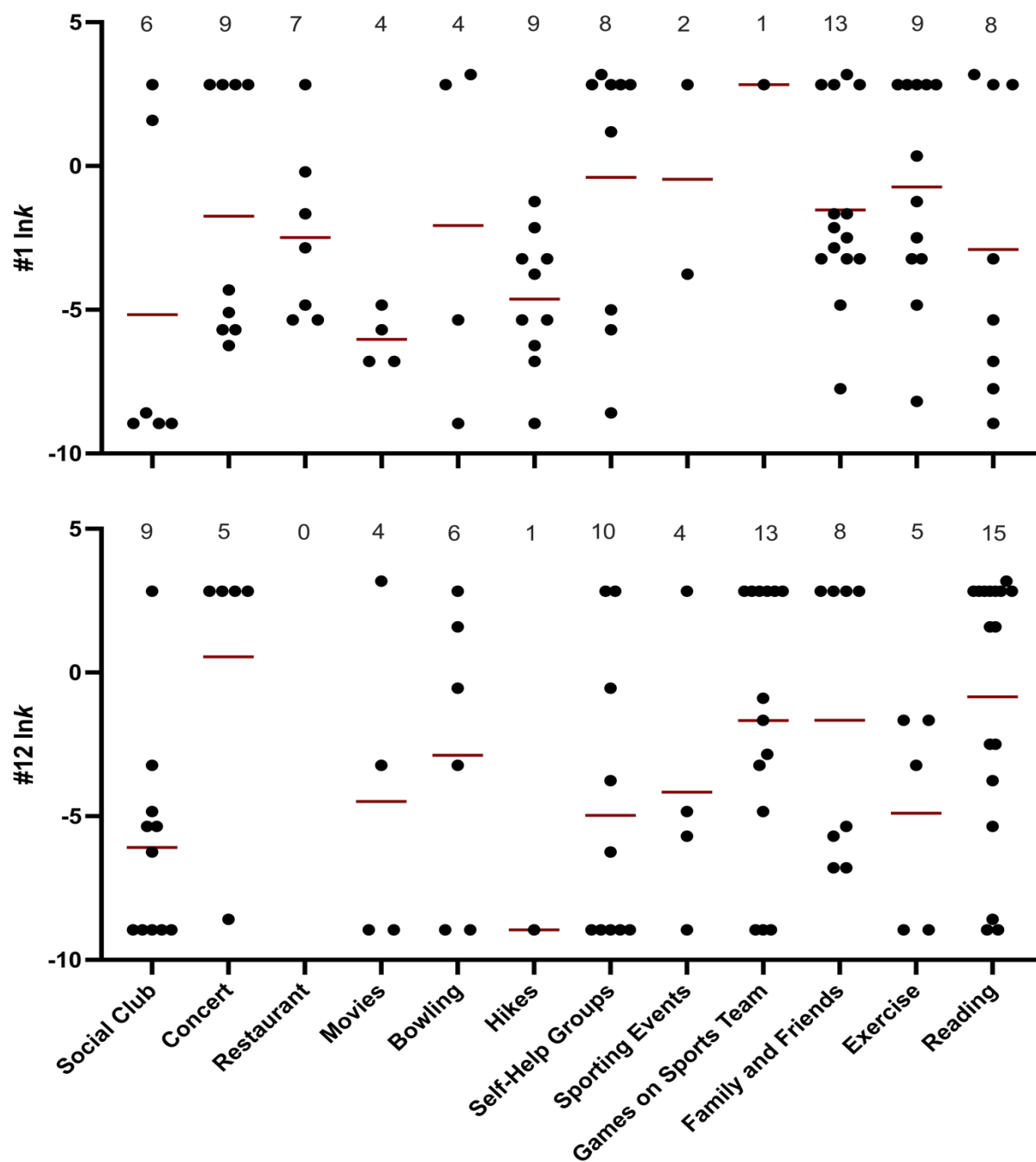
Note. The mean *ln*k values of each community activity when it was ranked #1 and #12 are shown in red. The black data points each indicate a participant with the total number of participants shown above each data set.

Figure 4

*Difference in ln*k *Values for #1 and #12 Ranked Community Reinforcers*
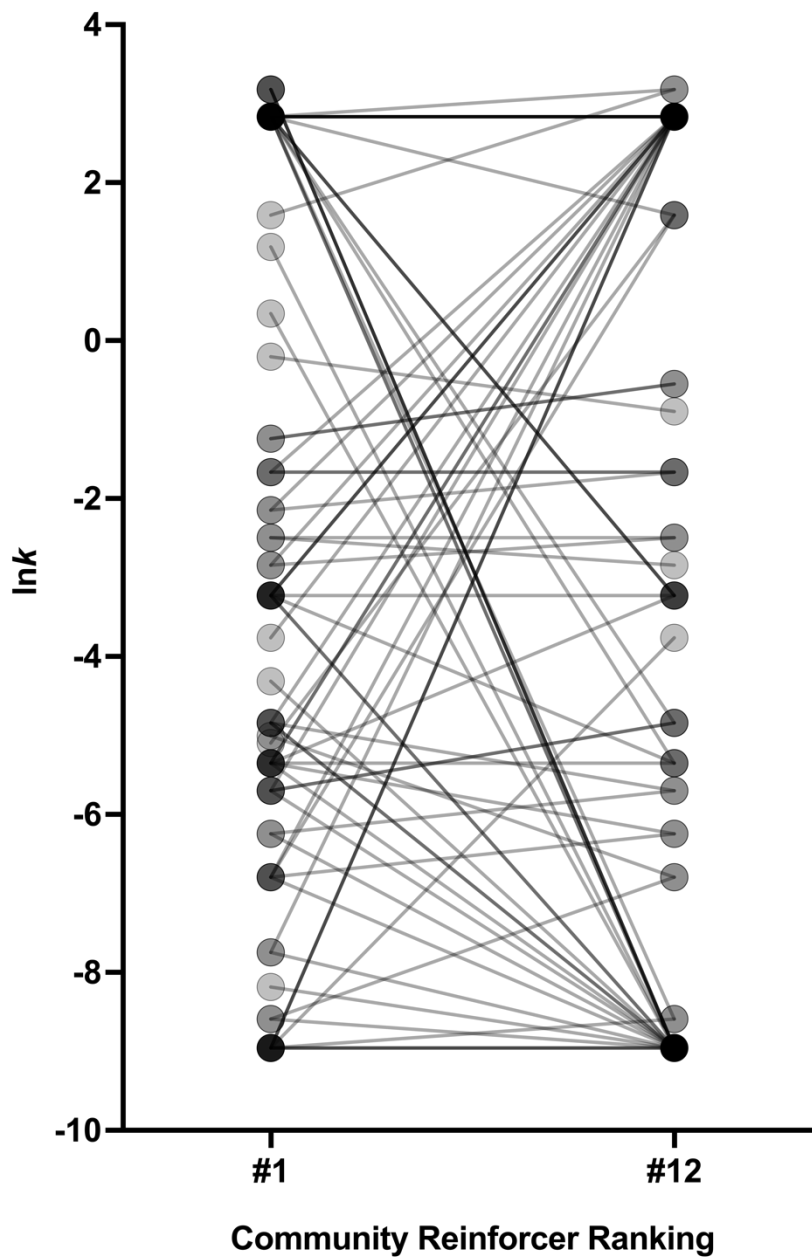
Note. Before-After plot of #1 and #12 ranked community reinforcers with each data point indicating a participant. Darker data points and lines indicate higher degrees of overlap of participants with the same *ln*k values.

Figure 5

*Patterns in Difference in ln*k *Values for #1 and #12 Ranked Community Reinforcers*
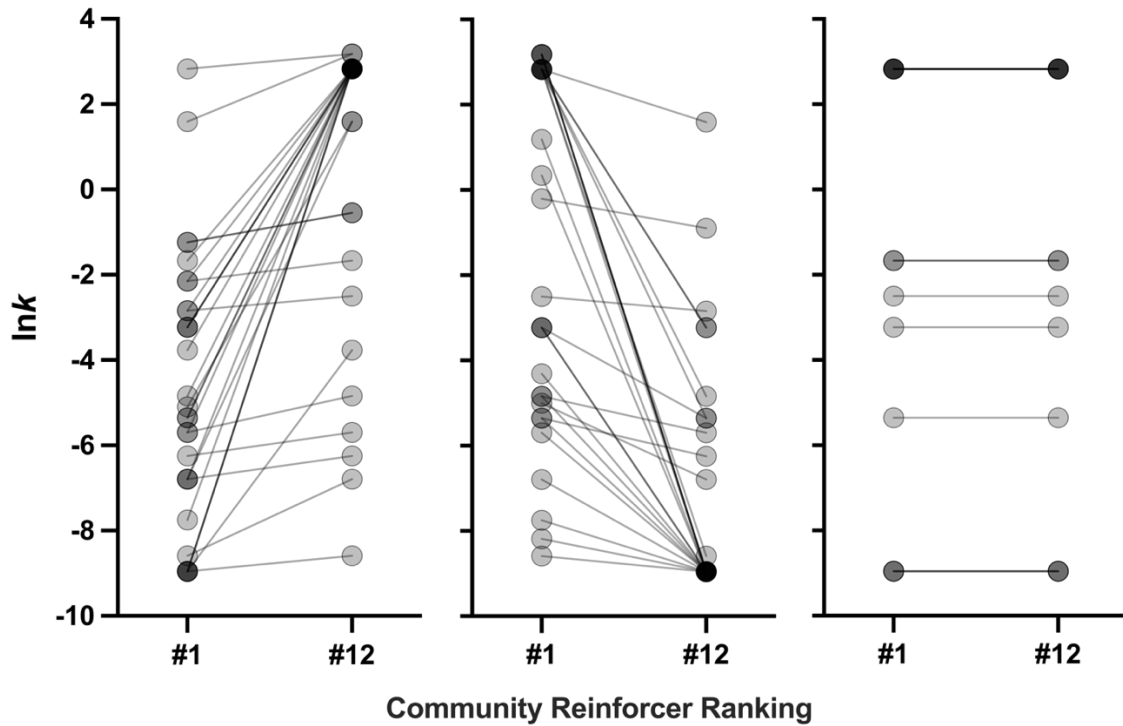
Note. Each graph shows the *ln*k values on the *y*-axis and #1 and #12 ranked on the *x*-axis. Each

data point indicates a participant with the darker points indicating a higher degree of overlap

between *ln*k values. The leftmost graph depicts high delay discounting of the #1 ranked

reinforcer whereas the middle graph shows higher delay discounting of the #12 reinforcer and

the rightmost graph shows no change in discounting between the #1 and #12 ranked reinforcer

Figure 6

Frequency of Relative in Change in lnk Between #1 and #12 Ranked Reinforcer
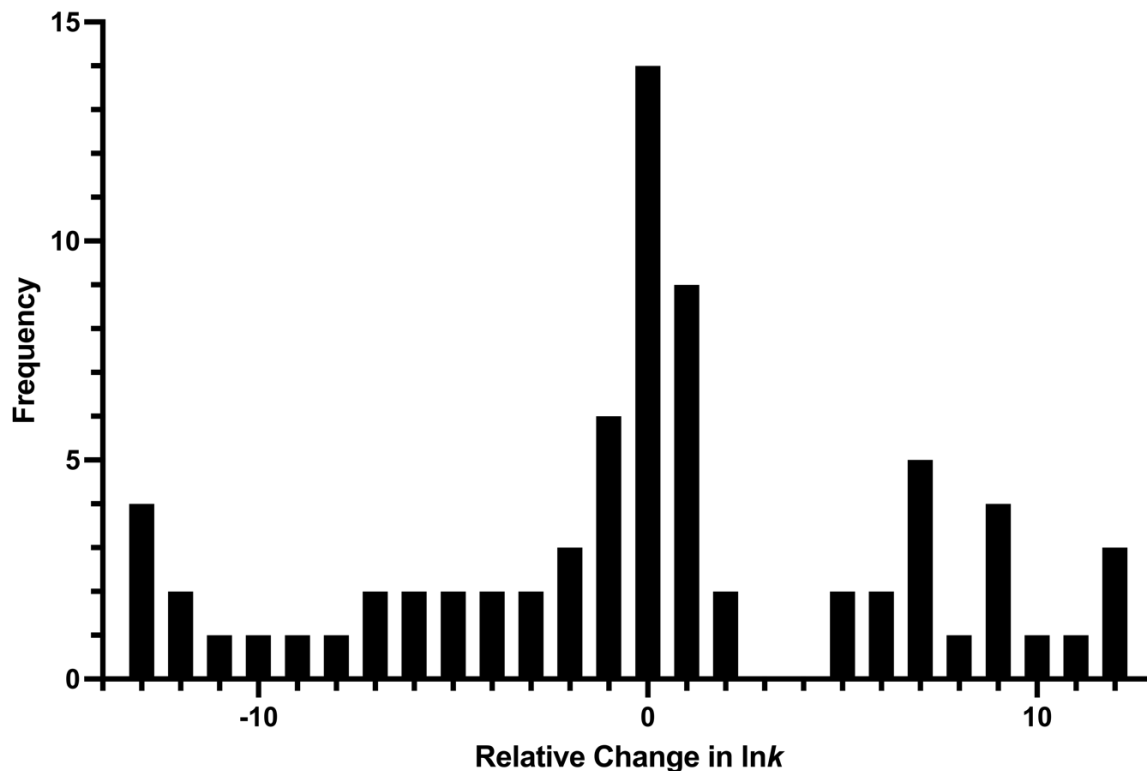
Note. Frequency of relative change in *ln*k values between participant's #1 and #12 ranked activities. Relative change values below -10 indicate higher levels of discounting of the #12 ranked compared to the #1 ranked reinforcer. Relative change values around zero indicate little to no difference in discounting of #1 and #12 ranked activities. Relative changes above 10 indicate higher discounting of #1 ranked compared to #12 ranked reinforcers.

Figure 7

Community Reinforcer Rating as a Function of Ranking
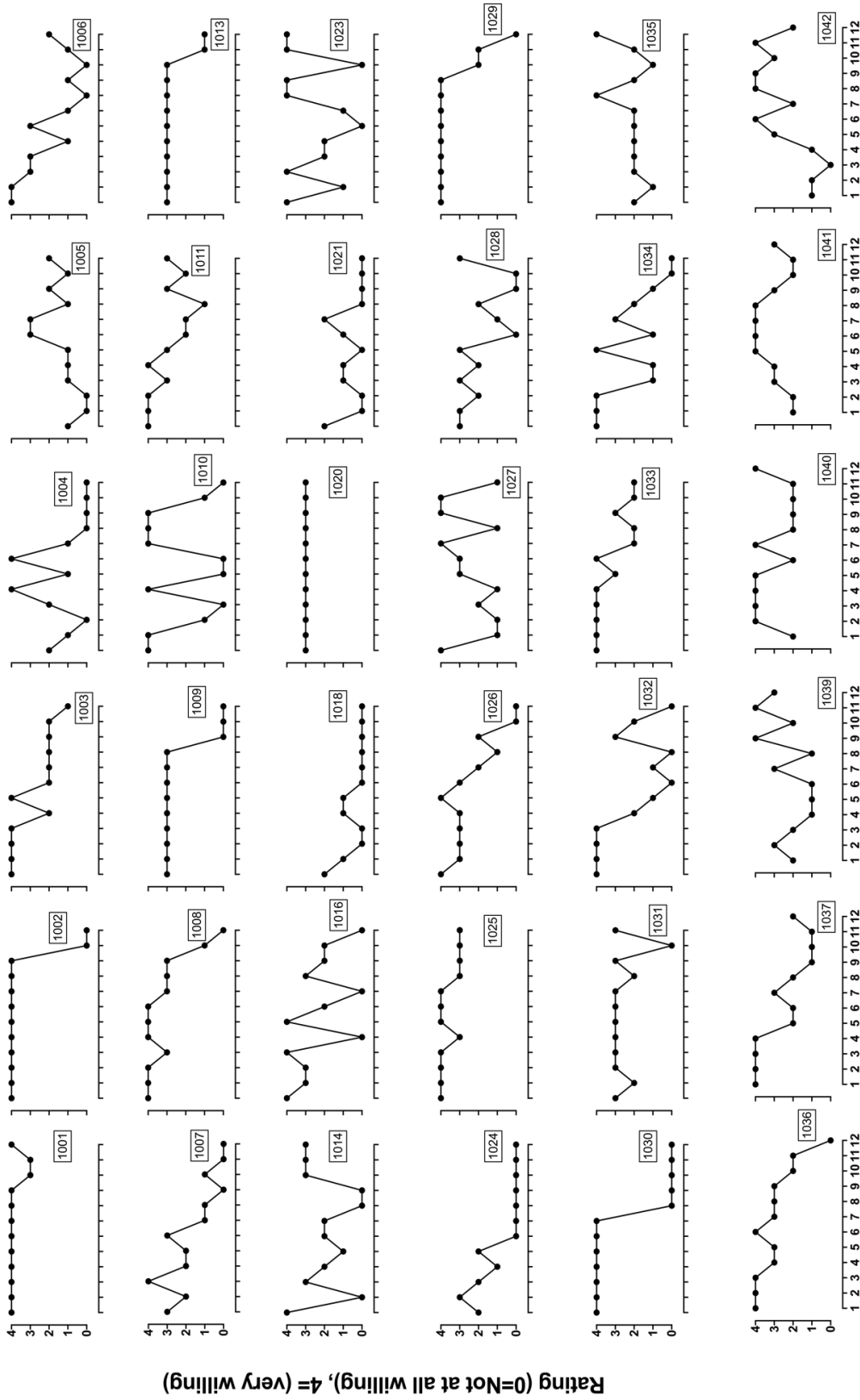
Community Reinforcer Rating as a Function of Ranking- Continued

Ranking (1=Most likely to engage in), 12= (Least likely to engage in)

Rating (0=Not at all willing), 4= (very willing)

Community Reinforcer Rating as a Function of Ranking- Continued
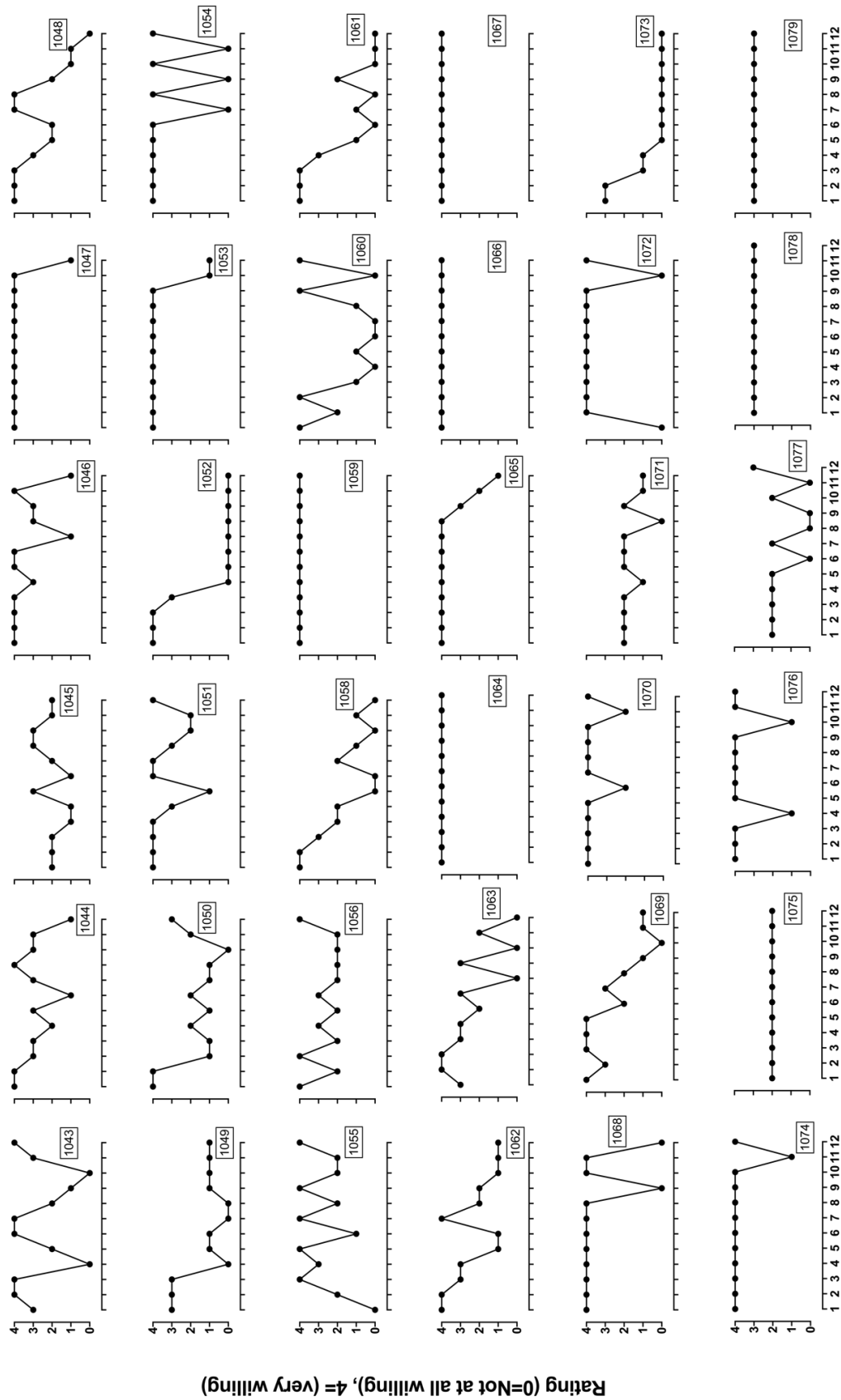
Ranking (1=Most likely to engage in), 12= (Least likely to engage in)

Rating (0=Not at all willing), 4= (very willing)
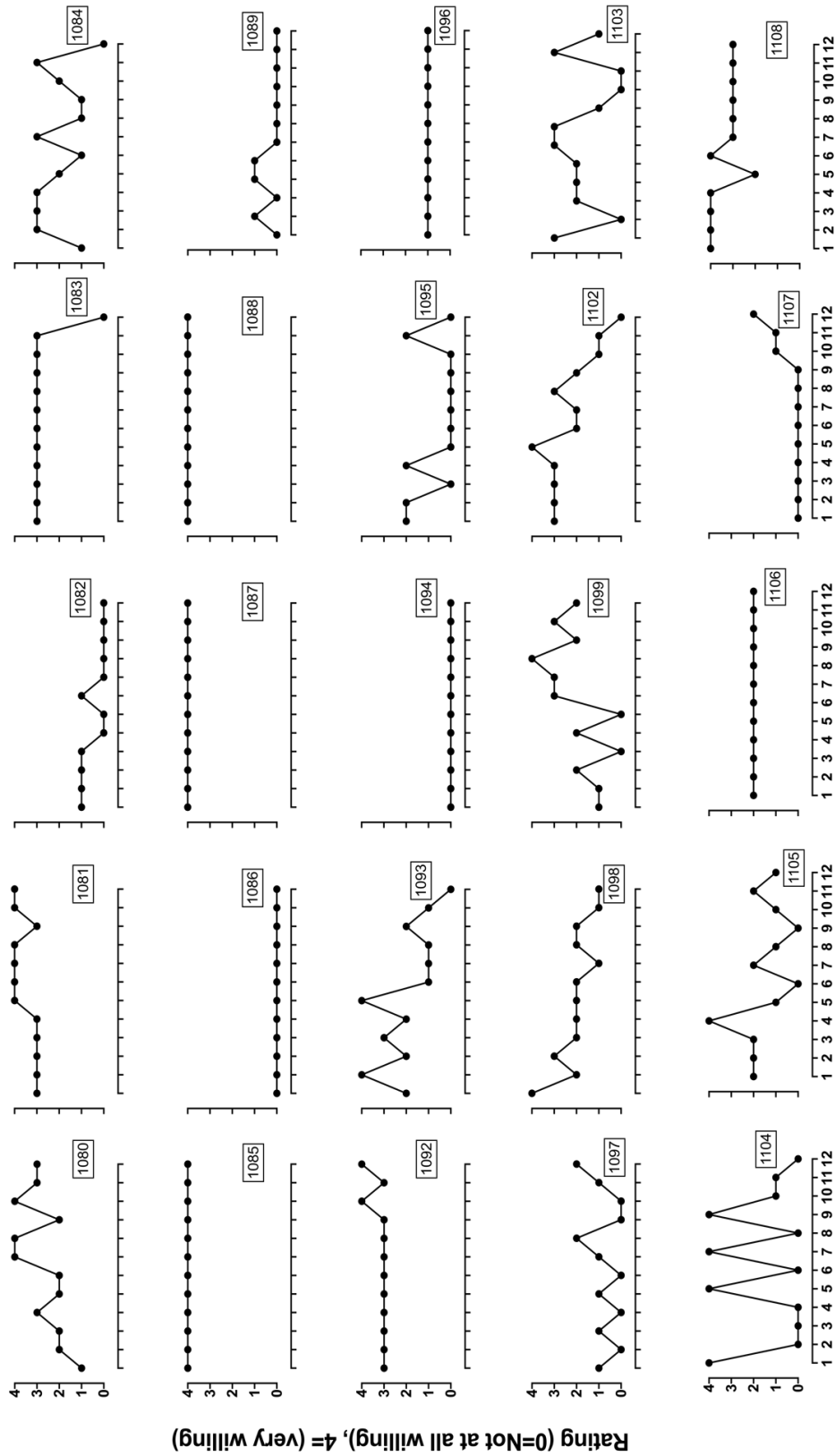
Note. Each graph depicts an individual participant's rating and ranking for each of the twelve community reinforcers. Ratings for willingness to maintain abstinence for a specific activity are displayed on the *y*-axis, with values of 0 (not at all), 1 (a little), 2 (a fair amount), 3 (willing), to 4 (very willing). Willingness to engage in a specific activity to maintain abstinence are scaled to the *x*-axis, with values from 1 (most likely to engage in) to 12 (least likely to engage in).

Figure 8

Median lnk Values for #1 and #12 Ranked Activities and MCQ
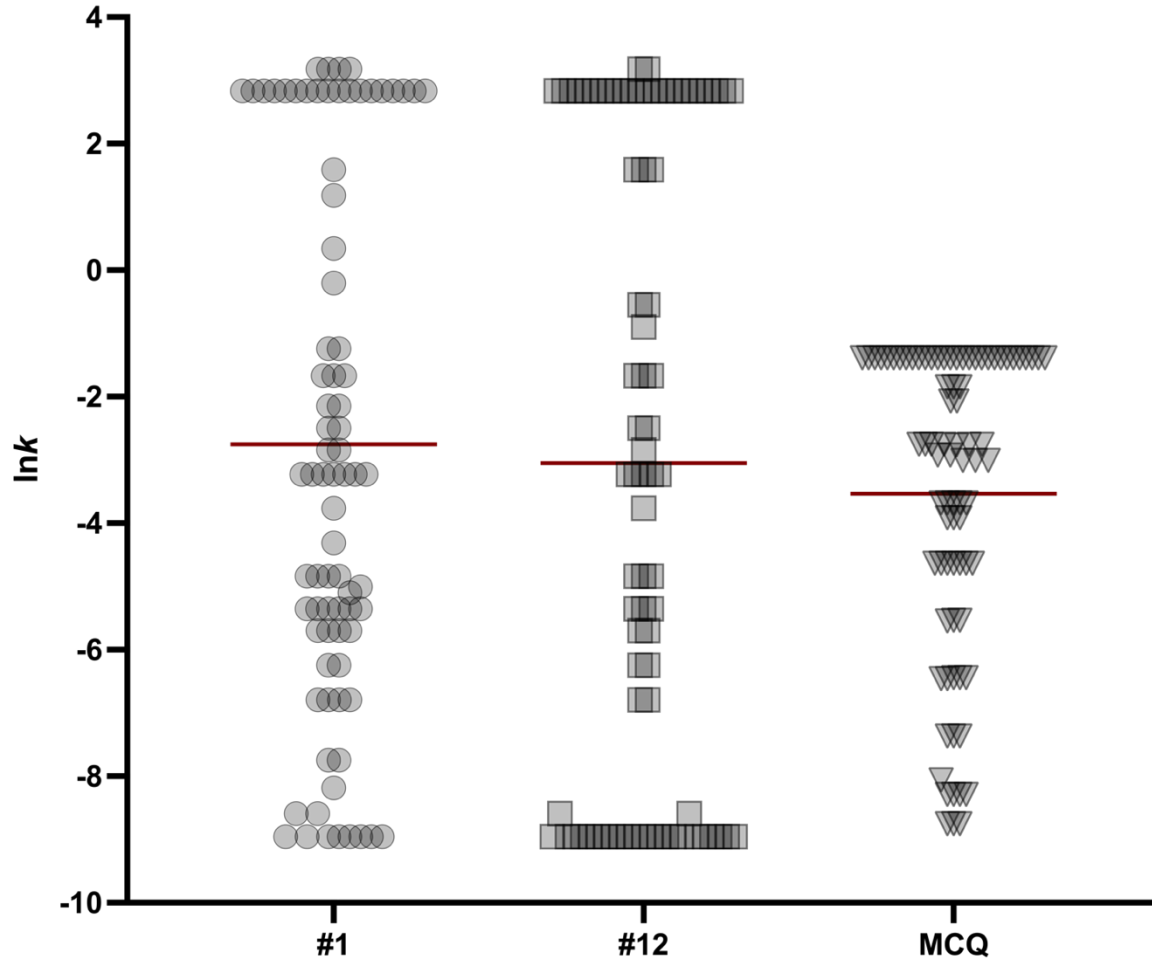
Note. This figure depicts *ln*k values for the #1 and #12 ranked and MCQ. The *ln*k values for #1 ranked activities are indicated by circles, the #12 ranked activities by squares and the MCQ values by triangles. The median values are indicated by red horizontal lines. Darker data points indicate higher degrees of overlap of participant values and light grey indicate little to no overlap.

Figure 9

k Proportion, Average Equating Amount for #1 and #12 Ranked Reinforcers

k Proportion	Community Reinforcer	Avg. Amount = $100 #1	#12	N #1	#12
	social club	26	15	6	9
	concerts	18	3	9	5
	restaurant	14		7	0
	movies	6	7	4	4
	bowling	13	22	4	6
	hikes	16	2	9	1
	self-help	24	25	8	10
	sporting events	51	3	2	4
	games on a sports team	50	3	1	13
	family or friends	26	33	13	8
	exercise	44	10	9	5
	reading	56	33	8	15
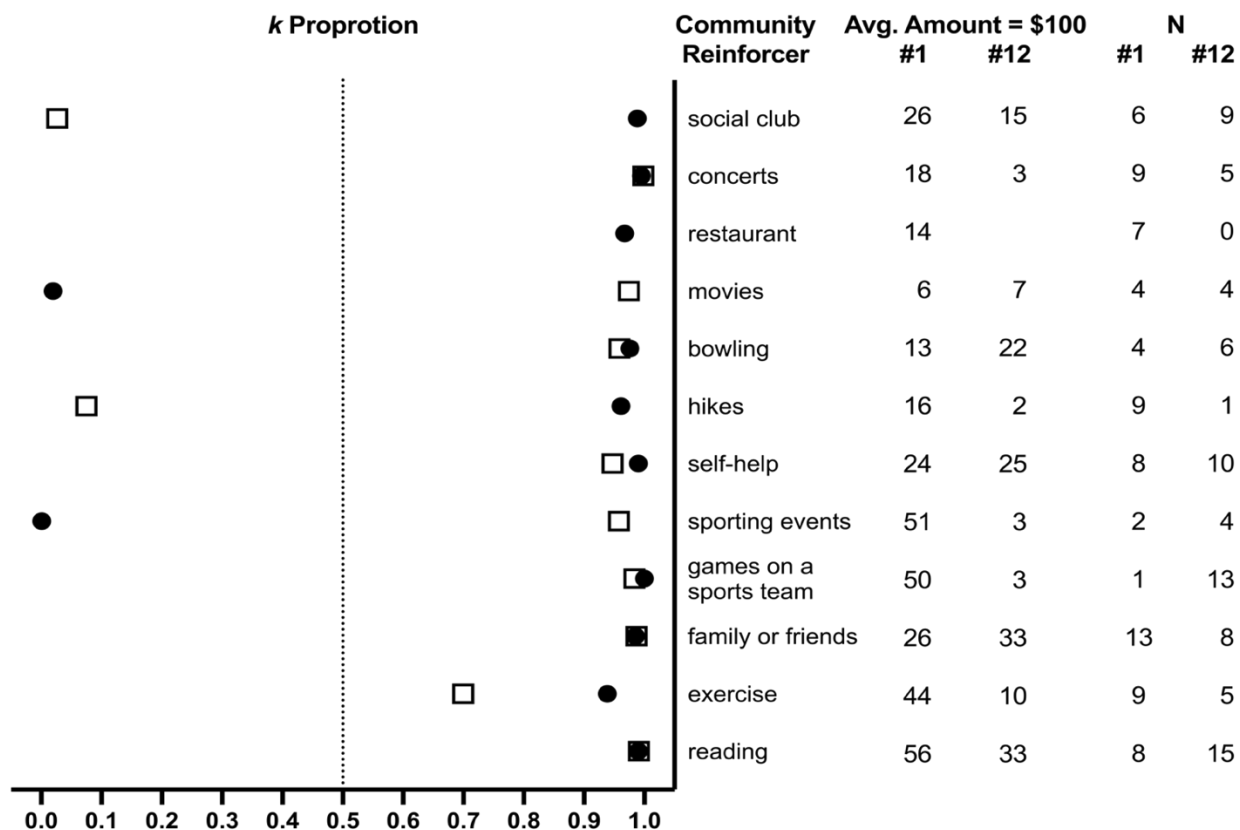
Note. k proportions for each reinforcer when it was ranked #1 and #12 are plotted on a continuum with #1 ranking denoted with a filled circle and #12 ranking with an open square. The right margin lists the community reinforcer, the average equated value of that activity, and the sample size

Appendix A

Appendix B

PARTICIPANT CONSENT

The Department of Applied Behavior Analysis at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present study. You should be aware that even if you agree to participate, you are free to withdraw at any time without penalty.

We are conducting this study to better understand the effect of community reinforcer approach on abstinence from substance use. This will entail your completion of a survey. Your participation is expected to take approximately 3 minutes. The content of the survey should cause no more discomfort than you would experience in your everyday life.

Although participation may not benefit you directly, we believe that the information obtained from this study will help us gain a better understanding of the effect of community reinforcer approach on abstinence from substance use. Your participation is solicited, although strictly voluntary. Your name will not be associated in any way with the research findings. No personally identifiable information will be obtained in the survey. With the possible exception individuals who provided a paper copy of the form to participants, no one will be able to determine which participants provided which responses. It is possible, however, with internet communications, that through intent or accident someone other than the intended recipient may see your response.

Key Information:

- This project is studying community reinforcer preference. Your participation in this research project is completely voluntary.
- Your participation will take less than 5 minutes. You will be asked to complete a short survey about your preferences for community activities.
- The content of the survey should cause no more discomfort than you would experience in your everyday life.
- Participation on may not benefit you directly, we believe that the information obtained from this study will help us gain a better understanding of the effect of community reinforcer approach on abstinence from substance use.
- Your alternative to participating in this research study is not to participate.

If you have any additional questions about your rights as a research participant, you may call (785) 864-7429 or write the Human Research Protection Program (HRPP), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7563, email irb@ku.edu.

Checking the box below and completion of the survey indicates your willingness to take part in this study and that you are at least 18 years old.

- ○ I have read and understood the above and consent to participating in this study
- ○ I do not wish to participate in this study

Skip To: End of Survey If QID4 != I have read and understood the above and consent to participating in this study

1 How do you identify?

○ Man

○ Woman

○ Transgender

○ Non-binary

○ Prefer not to say

○ Self identify _____

2 What age group do you fall into?

○ 18-25

○ 26-35

○ 36-45

○ 46-55

○ 56-65

○ over 65

3 Where do you currently reside?

○ Canada

○ United Stated

4 Are you currently receiving treatment for substance related issues?

○ Yes

○ No

5 What types of substances do you currently (i.e. in the last three months) or have you previously used for recreational purposes?

	Daily	Weekly	Monthly	Used once or twice	Used previously but not in the last 3 months	Never used	Prefer not to say
Opioids (heroin, fentanyl, OxyCotin, Percocets, Vicodin, down, etc.)	○	○	○	○	○	○	○
Cocaine (coke, crack, blow, etc.)	○	○	○	○	○	○	○
Prescription Stimulants (Ritalin, Concerta, Adderall, etc.)	○	○	○	○	○	○	○
Methamphetamine (speed, crystal meth, ice, etc.)	○	○	○	○	○	○	○
Inhalants (nitrous oxide, glue, gas, paint thinner, etc.)	○	○	○	○	○	○	○
Sedatives or sleeping pills (Valium, Ativan, Xanax, GHB, etc.)	○	○	○	○	○	○	○
Hallucinogens (LSD, mushrooms, acid, PCP, Special K, ecstasy, etc.)	○	○	○	○	○	○	○
Cannabis (weed, pot, grass, shatter, etc.)	○	○	○	○	○	○	○
Alcohol	○	○	○	○	○	○	○

6 On a scale of 0-4 from NOT AT ALL WILLING (0) to engage in to maintain abstinence and VERY WILLING (4) to engage in to maintain abstinence, please rate the following activities:

	0 (not at all)	1 (a little)	2 (a fair amount)	3 (willing)	4 (very willing)
social club outings	◯	◯	◯	◯	◯
concerts	◯	◯	◯	◯	◯
meals at a restaurant	◯	◯	◯	◯	◯
movies seen at a theater	◯	◯	◯	◯	◯
bowling games	◯	◯	◯	◯	◯
hikes	◯	◯	◯	◯	◯
self-help groups	◯	◯	◯	◯	◯
sporting events	◯	◯	◯	◯	◯
playing games on a sports team	◯	◯	◯	◯	◯
activities with family or friends	◯	◯	◯	◯	◯
exercise activities	◯	◯	◯	◯	◯
moments to read	◯	◯	◯	◯	◯

7 Rank the following activities from MOST (1) likely to engage in to maintain abstinence to LEAST (12) likely to engage in.

_____ social club outings (1)

_____ concerts (2)

_____ meals at a restaurant (3)

_____ movies seen at a theater (4)

_____ bowling games (5)

_____ hikes (6)

_____ self-help groups (7)

_____ sporting events (8)

_____ playing games on a sports team (9)

_____ activities with family or friends (10)

_____ exercise activities (11)

_____ moments to read (12)

---

8 What amount of {#1RankedReinforcer} do you think are equal to $100?
(Please enter a number between 2 and 100)

Participant entered value

9 What amount of {#12RankedReinforcer} do you think are equal to $100?
(Please enter a number between 2 and 100)

Participant entered value

---

1 The following questions will ask you to choose which of two activities you prefer in a setting previous to the pandemic. For each activity, assume that travel to and from any event is provided and the cost of the event has been covered. You will not participate in the activities that you choose, but we want you to make your decisions as though you were really going to participate in the activities you select. The choices you make are completely up to you, please select the option that you prefer. There is no right or wrong answer. You are not expected to choose one particular activity over another. Just choose the activity that you really want.

○ {1/2 amount}{#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in three weeks

2 Choose which activities you prefer

○ {1/2 amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in one day

3 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in two years

4 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in four hours

5 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in four days

6 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in four months

7 Choose which activities you prefer

- ○ {½ amount} {#1RankedReinforcer} now

- ○ {Full amount} {#1RankedReinforcer} in eight years

8 Choose which activities you prefer

- ○ {½ amount} {#1RankedReinforcer} now

- ○ {Full amount} {#1RankedReinforcer} in two hours

9 Choose which activities you prefer

- ○ {½ amount} {#1RankedReinforcer} now

- ○ {Full amount} {#1RankedReinforcer} in nine hours

10 Choose which activities you prefer

- ○ {½ amount} {#1RankedReinforcer} now

- ○ {Full amount} {#1RankedReinforcer} in two days

11 Choose which activities you prefer

- ○ {½ amount} {#1RankedReinforcer} now

- ○ {Full amount} {#1RankedReinforcer} in one and a half weeks

12 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in two months

13 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in eight months

14 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in four years

15 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in eighteen years

16 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in one hour

17 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in one hour

18 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in six hours

19 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in twelve hours

20 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in one and a half days

21 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in three days

22 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in one week

23 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in two weeks

24 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in one month

25 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in three months

26 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in six months

27 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in one year

28 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in three years

29 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in five years

30 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in twelve years

31 Choose which activities you prefer

○ {½ amount} {#1RankedReinforcer} now

○ {Full amount} {#1RankedReinforcer} in twenty-five years

32 The following questions will ask you to choose which of two activities you prefer in a setting previous to the pandemic. For each activity, assume that travel to and from any event is provided and the cost of the event has been covered. You will not participate in the activities that you choose, but we want you to make your decisions as though you were really going to participate in the activities you select. The choices you make are completely up to you, please select the option that you prefer. There is no right or wrong answer. You are not expected to choose one particular activity over another. Just choose the activity that you really want.

○ {1/2 amount}{#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in three weeks

Display This Question:

If 32 = {1/2 amount}{#12RankedReinforcer} now

33 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in one day

Display This Question:

If 32 = {Full amount} {#12RankedReinforcer} in three weeks

34 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in two years

Display This Question:

If 33 = {1/2 amount} {#12RankedReinforcer} now

35 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in four hours

---

36 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in four days

---

37 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in four months

---

38 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in eight years

---

39 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in two hours

---

40 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in nine hours

41 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in two days

42 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in one and a half weeks

43 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in two months

44 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in eight months

45 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in four years

46 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in eighteen years

47 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in one hour

48 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in one hour

49 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in six hours

50 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in twelve hours

51 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in one and a half days

52 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in three days

53 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in one week

54 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in two weeks

55 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in one month

56 Choose which activities you prefer

○   {1/2 amount} {#12RankedReinforcer} now

○   {Full amount}{#12RankedReinforcer} in three months

57 Choose which activities you prefer

○   {1/2 amount} {#12RankedReinforcer} now

○   {Full amount}{#12RankedReinforcer} in six months

58 Choose which activities you prefer

○   {1/2 amount} {#12RankedReinforcer} now

○   {Full amount}{#12RankedReinforcer} in one year

59 Choose which activities you prefer

○   {1/2 amount} {#12RankedReinforcer} now

○   {Full amount}{#12RankedReinforcer} in three years

60 Choose which activities you prefer

○   {1/2 amount} {#12RankedReinforcer} now

○   {Full amount}{#12RankedReinforcer} in five years

61 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in twelve years

- -

62 Choose which activities you prefer

○ {1/2 amount} {#12RankedReinforcer} now

○ {Full amount}{#12RankedReinforcer} in twenty-five years

63 Would you rather have

○ $54 today

○ $55 in 117 days

64 Would you rather have

○ $47 today

○ $50 in 160 days

65 Would you rather have

○ $25 today

○ $60 in 14 days

66 Would you rather have

○ $55 in 62 days

○ $40 today

67 Would you rather have

○ $50 in 21 days

○ $27 today

68 Would you rather have

○ $49 today

○ $60 in 89 days

69 Would you rather have

○ $50 in 30 days

○ $34 today

70 Would you rather have

○ $60 in 111 days

○ $54 today

71 Would you rather have

○ $20 today

○ $55 in 7 days

---

72 Did the activities included make sense?

○ Yes

○ No

73 Are there other activities prefer more?
If Yes, please specify:

○ Yes _____

○ No

Appendix C

Community Reinforcer Survey

Q1 Please list any social or recreational community reinforcers you currently implement or have implemented with the substance abuse treatment programs you provide.

_____

Q2 Are the community reinforcers used participant specific or are the same community reinforcers available to all participants?

○ Participant specific (1)

○ Not participant specific, community reinforcers are available to all participants (2)

Q3 Please indicate what site/location has implemented these community reinforcers.

_____

Q4 Are you a Board Certified Behavior Analyst?

○ Yes (1)

○ No (2)