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An Examination of Delay Discounting in Sex Offenders with Dual Diagnoses

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AN EXAMINATION OF DELAY DISCOUNTING IN SEX OFFENDERS WITH DUAL DIAGNOSES

By

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A Thesis

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Discounting of delayed rewards by sex offenders with dual diagnoses was compared to discounting of delayed rewards by matched control non-offenders with dual diagnoses. All participants completed a hypothetical choice task in which they made repeated choices between 10 dollars/servings after a delay and an equal or lesser amount available immediately. The delay to the large reward was varied from 1 day to 2 years across conditions. Indifference points between immediate and delayed rewards were identified at each delay condition by varying the amount of immediate money across choice trials. Overall, those identified as sex offenders discounted the delayed reward more steeply than did the control non-offenders

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CHAPTER 1

INTRODUCTION

Recent statistics regarding child welfare in the United States report that an estimated 676,569 children were victims of child abuse or neglect in 2011 (U.S. Department of Health and Human Services, 2011). Of those cases, approximately 9.1%, or 61,472, children were victims of sexual abuse and 0.4% of those instances of sexual abuse resulted in fatalities (U.S. Department of Health and Human Services, 2011). In addition, 30% of children who are sexually abused will become sexually abusive later in life (Criminal Justice Agency, 2013) and the annual cost to incarcerate offenders is $22,000 (Criminal Justice Agency, 2013). These statistics, however, can be considered conservative because it is unlikely that all abuse cases are reported to the authorities (Reyes et al., 2006).

Generally, the most common perpetrators of child abuse are either the child's biological parents or caregivers (U.S. Department of Health and Human Services, 2011). Regarding reported incidents of sexual abuse, perpetrator parents comprise less than 3% of all cases. The vast majority of sexual abuse offenders consist of other relatives, followed by day-care providers, residential facility staff, and unmarried partners of parents (U.S. Department of Health and Human Services, 2011). Due to the population variance, specific demographics and characteristics of sex offenders are difficult to categorize (Reyes et al, 2006). However, it is generally accepted that characteristics of offenders seem to match those of non-offenders (Reyes, Vollmer, & Hall, 2011).

Another leading factor complicating the categorization of sex offenders includes obtaining information on their intellectual functioning (Reyes et al, 2006; Reyes, Volmer, & Hall, 2011). Due to the difficulty evaluating intellectual ability, determining exactly what percentages of sex offenders have intellectual disabilities is cumbersome. Studies examining juvenile offenders suggest that 30-60% of the offender's exhibit learning disabilities, up to 80% have a diagnosable psychiatric disorder, and many have difficulties with impulse control and judgment (Barbaree, Hudson, & Seto, 1993). In addition, offenders with mental health disorders, whether incarcerated or in the community, are at an increased risk for behavior problems that may cause harm to self and others (Shelton et al., 2009).

The difficulties presented in identifying specific demographics, IQ scores, adaptive functioning, and history of abuse makes contemporary person-centered treatment methods difficult to design and success rates for sex offenders with disabilities low (Wakefield & Underwager, 1991). For example Hanson, Scott, & Steffy (1995) compared the recidivism rates of a sample comprised of 191 child molesters and 137 nonsexual offenders over a 15 to 30-year period. During this time period, 83.2% of the nonsexual criminals recidivated while 61.8% of the child molesters reoffended. In analyzing the characteristics of the offending behavior, the authors reported that when the child molesters reoffended the crime was of a sexual nature, whereas the nonsexual criminals were responsible for the majority of nonsexual violent crimes. Although the recidivism rates are lower for child molesters, 61.8 % is considered high for the seriousness of the offense. Also, as stated earlier, sex offenses tend to be reported less than nonsexual offenses (Reyes et al., 2006). These collateral factors present a unique challenge to behavior analysts and other practitioners to find creative ways to empirically measure

attributes of offenders in an attempt to assess targets and triggers, design effective person-centered treatment, and identify those individuals that are most likely to reoffend.

Current Assessments

Current risk assessment methods are often considered clinical or structured and most are focused on predicting violent and/or sexual recidivism in an effort to support public safety. There are currently four major types of assessment (Hanson & Morton-Bourgon, 2007):

- The first is the empirical actuarial approach in which items are selected based on observed relationships with outcome, and explicit rules are provided for combining items into an overall evaluation of risk (Hanson & Morton-Bourgon, 2007). For example, the Static–99 (Hanson & Thornton, 2000) is by far the most commonly used actuarial risk tool with adult sexual offenders (Archer et al., 2006), the items on the Static-99 are meant to assess risk of recidivism and to assist with case management. Example items include past supervision failure, sexual deviation, psychopathology, major mental illness, employment problems, and lack of realistic plans. No explicit procedure is provided for translating the ratings on the items into an overall evaluation of risk. Boer et al. (1997) stated that risk will typically increase monotonically with each additional risk factor, but they recommended against simply adding the items. Instead, they directed evaluators to use their own professional judgment to rate the risk as low, moderate, or high. Scores on the SVR–20 are not linked to expected recidivism rates (Hanson & Morton-Bourgon, 2007).

- The second assessment method is the conceptual actuarial approach. In this approach the final judgment is determined by explicit rules but the items are selected based on theory. For example, the Stable & Acute (S & A)is a popular conceptual actuarial assessment. It provides a structured method for identifying and measuring dynamic risk factors that are predictive of sexual offence recidivism. The S & A is comprised of two separate but related scales consisting of an initial assessment of Stable items, and subsequent follow-up assessment of Acute items. The Stable consists of 13 items. The emotional identification with children item is omitted from the scale if the offender does not have a child victim. Each Stable item is rated as zero (low), one (moderate risk), or two (high risk), to give a total score out of 26 for offenders with child victims or 24 for offenders with adult victims. The Acute consists of four items that provide a score for sex/violence as well as three items that are scored and added to the sex violence score, providing an overall risk of recidivism. Each item can be scored between zero and two as described above (McNaughton et al., 2010).
- Third, the structured professional judgment is defined as requiring evaluators to rate a list of pre-determined items, but, the final evaluation is left to professional judgment and is promoted as providing clinically meaningful case formulations while avoiding the poor predicative accuracy associated with the unstructured clinical approach. The SVR-20 is probably the most commonly used structured professional judgment instrument for the risk assessment of sexual offenders (Bengtson & Langstom, 2007). The administration of the SVR-20 can be divided into three general steps of the risk assessment process. First, the 20 items, as well as any additional case-specific risk

factors, have to be coded by an experienced forensic clinician. The items are rated using a three-point ordinal rating scale as definitely present, possibly/partially present, or absent. In the second step, the evaluator indicates for each present risk factor whether there has been any recent change in the status of that factor within a flexible time frame. Changes are also coded on a three-point ordinal rating scale in terms of exacerbation, no change, or amelioration. In the final step, users make a final judgment about the risk of future violence, again, using a three point ordinal rating scale. This final risk judgment should be rated as low, moderate, or high, which is also indicative of the degree of intervention required in each individual case. For example, a final judgment of high risk would indicate an urgent need to develop and start a comprehensive risk-management plan for the individual, which would feature more resources than in the case of moderate or low risk (Rettenberger, Hucker, Boer, & Eher, 2009)

- Lastly is the unstructured professional judgment. The unstructured professional judgment evaluates risk factors that are not specified in advance, nor are the methods of combining the risk factors used into an overall evaluation of risk. Factors of relevance are identified by each examiner based on training and experience. Each assessment varies from clinician to clinician, has poor reliability, poor validity, and is person focused as well as pays little attention to important environmental variables.

In comparing assessment approaches, the empirical actuarial measures performed better in predicting sexual recidivism than unstructured professional judgment. However, there was little difference in predictive accuracy between the empirical and conceptual actuarial measures. Professional judgment was shown to be more accurate then unstructured professional

judgments, but less accurate than empirical assessments (Hanson & Morton-Bourgon, 2007). However, Actuarial risk tools are now routinely used in applied risk assessment with offenders (Archer, Buffington-Vollum, Stredny, & Handel, 2006) For example, previous research on the accuracy of Static-99 and Static-2002 has focused on the ability of these risk tools to differentiate offenders on their risk for recidivism (Hanson, Helmus, Llyod, & Thorton, 2012). For example, predictive accuracy is routinely reported in terms of correlation coefficients, areas under receiver operating characteristics curves (AUC for ROC), or standardized mean differences (Cohen's d). These indices describe the extent to which the recidivists are different from the non-recidivists, but provide no information about the absolute recidivism rates. Even when the AUCs are consistent across studies, it is possible for there to be meaningful differences in the observed recidivism rates (Mossman, 2006). Relatively little research has examined the stability of the observed recidivism rates of actuarial risk tools for sexual offenders and conventions have yet to be developed concerning the best ways to report predictive accuracy in terms of absolute recidivism rates (Hanson et al., 2012).

Current assessment methodologies on sex offenders in behavior analytic literature focus on assessments of deviant arousal (Reyes et al, 2006; Reyes et al, 2011). These studies specifically examined penile circumference, called phallometric assessment, where offenders are connected to a mercury-in-rubber strain gage and are exposed to several inappropriate stimuli (eight to nine year old children) and to several appropriate stimuli (adult men and women). More specifically, phallometric assessments objectively measure the conditions under which an arousal response is more likely to occur by isolating variables responsible for arousal, increasing the likelihood of finding specific points to focus on during treatment. For example,

the outcomes of a phallometric arousal assessment may indicate that a particular individual is differentially aroused in the presence of boys ranging in age from 9 to 11. Using this information, interventions can then be designed to target this particular demographic category (Reyes et al. 2006). Phallometric assessment methodologies appear to be an improvement compared to other verbal response assessments because of the rigorous repeated measures and objective nature of the assessment. However, using phallometric arousal assessments can be highly intrusive and limits target populations to only males.

Even with all the current assessment methods, sex offenders and sex crimes continue to incite a great deal of fear among the general public and, as a result, lawmakers have passed a variety of social policies designed to protect community members from sexual victimization (LaFond, 2005). Legislative initiatives since the early 1990s have included sex offender registration, community notification, civil commitment, residence restrictions, enhanced sentencing guidelines, and electronic monitoring (LaFond, 2005). Such laws are popular with lawmakers and their constituents (Caputo, 2001; LaFond, 2005), although little empirical research has established their effectiveness in preventing sexual violence or decreasing sex offense recidivism. Skepticism about sex offenders' capacity to benefit from psychological interventions also appears to be a driving force behind sex offender legislation, especially in the wake of random sexual violence against children by repeat sex offenders (Quinn et al., 2004; Sample, 2001). Uncertainty about the effectiveness of sex offender treatment has been rampant for decades since a landmark study was unable to detect differences in recidivism rates between treated and untreated sex offenders (Furby, Weinrott, & Blackshaw, 1989). More recently, several sophisticated experimental designs have also failed to find significant

treatment effects (Hanson, Broom, & Stephenson, 2004; Marques, Miederanders, Day, Nelson, & van Ommeren, 2005). The average re-conviction rate for a child molester is 20% and for a rapist is 19% (Prevent Abuse Now, 2013). In general, the most effective treatments and assessments for sexual offenders have yet to be discovered (Reyes et al. 2006).

The goal of a more comprehensive and effective assessment of offenders should focus on the behavior of offending itself and the lack of self-control sexually deviant behavior requires. A first step that care providers or therapists might wish to take in the care for individuals found to be impulsive, like offenders, is to conduct an assessment of impulsivity to determine the specific direction therapy should take. Unfortunately, a valid and reliable assessment device that can detect and measure impulsivity in offenders is lacking in published literature. This is partially due to a clear understanding and consensus of what defines impulsivity for a person identified as an offender. Therefore, it may be advantageous for care providers to explore innovative means of assessment for determining degrees of impulsivity and the failure to understand the consequences of delayed actions. A procedure that has gained considerable attention in experimental analysis of behavior is entitled 'delayed discounting' (Dixon et al., 2005).

Delay Discounting

Delay discounting refers to the tendency for the present value of an outcome to be diminished, or discounted, by a delay receipt (Mazuer, 1987). Studies on delay discounting have shown that nonhumans and humans tend to shift their preferences from a larger delayed reward to a smaller immediate reward as the amount of time to receive the delayed reward

increases (Rachlin & Green, 1972; Rachlin, Raineri, & Cross, 1991; Dixon, Marley, & Jacobs, 2003). In other words, individuals tend to discount the value of a reward that is further away in time. This is often termed *impulsivity* as opposed to *self- control*. Impulsivity then, in behavioral terms, might be conceptualized as the selecting of a sooner smaller reinforcer over a larger delayed reinforcer (Dixon & Falcomata, 2004). For example, if a person identified as an offender is presented with a choice of engaging in treatment right now, which might produce a long-term delayed reinforcer (more independence), versus engaging in inappropriate sexual behavior and escaping the demands, often times the consequences of behaviors are too delayed to understand (Dixon et al., 2005).

The behavioral interpretation of impulsivity has led to numerous advances in clinical issues, such as increasing tolerance to reinforcement delays in individuals with acquired brain injury (Dixon & Cummings, 2001; Dixon & Falcomata, 2004) as well as in the general assessment of impulsivity in children with Attention Deficit Hyperactive Disorder(AD/HD; Hoerger & Mace, 2006; Neef et al. 2005), serious emotional disturbance (Neef, Mace, & Shade, 1993), and severe problem behaviors (Vollmer, Borrero, Lallim & Daniel, 1999).

The most commonly used procedure to measure impulsivity in a delay discounting task is the administration of a series of hypothetical monetary choice trails (Reed, Kaplan, & Brewer, 2012). Hypothetical monetary choices feature a fading series of choice between sooner smaller reinforcers (SSRs) and later larger reinforcers (LLRs). The point at which any individual switches from the LLR to the SSR is referred to as the *indifference point* (Dixon, Marley, & Jacobs 2003). This methodology is replicated over several different delays (days, weeks, months, years) in

order to get an understanding of the individuals preference for rewards over time (Madden & Johnson, 2010).

Delay discounting investigations have become increasingly popular because they are thought to capture important aspects of choice (Odum, Baumann, & Rimington 2006). Delay Discounting methodologies, however, are not without criticism in behavior analysis. For example, the employment of hypothetical choice, as well as the use of verbal self-report, is a substantial deviation from the direct measurement techniques usually used in behavior-analytic studies (Reed et al. 2012). Nevertheless, research to date indicates that hypothetical outcomes are discounted similarly to actual outcomes (Madden et al, 2003) and information gathered from discounting tasks have been used to increase treatment of individuals found to be impulsive (Dixon & Holton, 2009). Behavior analysts have also identified several factors that are known to impact the degree of discounting of the outcome of a value which can manipulate results (Odum et al., 2006). For example, smaller amounts tend to be discounted more steeply than larger amounts (Green and Myerson, 2004) and drugs are discounted more steeply than money (Coffey et al., 2003; Madden et al., 1997). These findings support some limited evidence that negative reinforcers may be discounted more steeply than positive reinforcers (taking drugs would relieve withdrawal symptoms) (Odum et al., 2006). Another possibility for the change in discounting between monetary and consumable rewards is that consumable items are just that, directly consumable. Monetary rewards, in the physical form, have no reinforcing quality; it is what can be exchange for the money that is reinforcing. This secondary reinforcing quality could account for the difference in directly consumable reinforcing items versus monetary rewards. In a direct within-subject comparison, Odum and Rainaud (2003) found that

people who were selected because they did not have any self-reported addictive disorders discounted drugs more steeply than money, and discounted food, another consumable reinforcer, similarly to alcohol. In addition, the difficult nature of describing delay discounting analysis may not be familiar too many behavior analysts. This statistical problem was accounted for by Reed et al.'s (2012) paper that uses a task analysis to assist researchers in the development of a discounting workbook through Excel 2010. This workbook opens potentially difficult analysis to practitioners or researchers whom may not be familiar with nonlinear regressions.

In an effort to further actuarial analysis in sex offender assessment, this study used the quantitative analysis of discounting hyperbolic equation developed by Mazur (1987) to calculate the degree of discounting:

$$V = A/(1 + kD).$$

In this equation, *V* is the subjective value of the delayed reward, also known as the indifference point or the point at which the delayed reward is equally as valuable as the immediate reward; *A* is the nominal amount of the delayed reward; *k* is a free parameter that describes sensitivity changes in delay; and *D* is the length of the delay. As the empirically derived *k* value increases, the discounted value (*V*) decreases more rapidly as a function of the delay (*D).* In other words the larger the degree of discounting (*k*), the quicker the discounted value decreases over time (Dixon, Marley, & Jacobs).

The present experiment attempts to follow up on a potential limitation of earlier studies using consumable versus monetary discounting assessments. Previous studies compared a

dollar amount of food versus a specific monetary amount (100 dollars' worth of food or 100 dollars). However, using these variables raises questions as to what is specifically being discounted. If an individual is discounting $100 of food, that individual could be discounting the dollar amount associated with the variable, not the consumable reward. In addition, the subject pool would need to be familiar with purchasing or quantifying 100 dollars worth of food (or any consumable item), which restricts the population in this study as subjects have little purchasing power. Therefore, the following study measures smaller amounts of rewards and uses direct servings as a variable versus money for food (10 servings as opposed to 10 dollars' for food). This measure was chosen to better assess the hypothesis that consumable rewards are discounted more steeply than monetary rewards.

To date, no research comparing sex offenders with a dual diagnoses to non-offending control participants has incorporated the hyperbolic equation paradigm, and it remains to be seen if offenders with dual diagnoses discount delayed rewards steeper than non-offending individuals with dual diagnoses. Furthermore, the present study attempts to assess the theory that consumable rewards are delayed more steeply than monetary, or non-consumable, rewards. Therefore, the current study examined the discounting of delayed monetary and consumable (food) rewards by sex offenders to determine if these individuals discount delayed rewards to a greater degree than individuals who are not offenders. First, we compared the group of persons identified as sex offenders with that of the non-offending control group across both money and food. Second, we compared discounting rates for the food and money condition to assess if discounting was steeper for the consumable reward.

CHAPTER 2

METHOD

Participants and Setting

16 subjects participated in this study. The target group consisted of eight male individuals (mean age = 46.25 years) who have been diagnosed with a mental health disorder, a developmental disorder, and have been identified as a sex offenders were recruited as participants. Specific participant information is discussed below:

- Participant A is a 51 year-old male with an IQ of 61 and diagnoses of Mild Mental Retardation (MR), Pedophilia, Gerd, and Cerebral Palsy. Daily medications include Cogentin (1 mg), Clonidine (.1 mg), Concerta (54 mg), and Pristiq (50 mg).
- Participant B is a 65 year-old male with an IQ of 66 and diagnoses of Mild MR, Hyperlipidemia, Gerd, Intermittent Explosive Disorder, Depression, and has a history of sexual offending. Daily medications include Seroquel (600 mg), Hydroxyzine (10 mg), and Depakote (1500 mg).
- Participant C is a 53 year-old man with an IQ of 71 and diagnoses of Mild MR, Anti-Social Personality Disorder, Depression Hyperlipidemia, and has a history of sexual offending. He is prescribed Prozac (10 mg).
- Participant D is a 27 year-old male with an IQ of 70 and diagnoses of Mild MR, Depression, Bi-Polar Disorder, Paranoid Personality Disorder, Passive-Aggressive Personality Disorder, and has a history of impulsivity and pedophilia. Daily medications include Lamictal (100 mg) and Trileptal (150 mg).

- Participant E is a 46 year-old male with an IQ of 61 and diagnoses of Mild MR, Anti-Social Personality Disorder, Depression with Psychotic Features, History of Voyeurism, and Sexual Disorder NOS. Daily medications include Depakote (500 mg) and Seroquel (400 mg).
- Participant F is a 52-year old male with a diagnoses of Mild MR and Paraphilia. He is prescribed Tergretol (200 mg).
- Participant G is a 22-year old male with a diagnoses of Mild MR and has a history of sexual offending. He is prescribed Depakote (500 mg).
- Participant H is a 54-year old male with diagnoses of Moderate MR, Antisocial Personality Disorder, Fetishism and Mood Disorder. Daily medications include Seroquel (300 mg) and Trileptal (150 mg).

Eight non-offending participants with a dual diagnoses (5 women and 3 men, mean age = 34 years) were recruited as a comparative control group.

- Participant I is a 23 year old-male with an IQ of 55 and diagnoses of Mild MR, , Bi-Polar, and ADHD. His daily medications include Seroquel (100 mg), Risperidone (5 mg), Depakote (500 mg), Hydroxyzine (50 mg), and Oxcarbazepine (600 mg).
- Participant J is a 55 year-old female with an IQ of 57 and diagnoses of Mild MR, Adjustment Disorder with mixed Disturbance, and Schizophrenia Paranoid Type. Daily medications include Depakote (250 mg) and Risperdal (2 mg).
- Participant K is a 23 year-old female with an IQ of 63 and diagnoses of Mild MR, Mood Disorder, Schizophrenia, Mixed Bi-Polar 1, Psychotic Disorder, Depression, and

Personality Disorder NOS. Daily medications include Clozapine (100 mg), Depakote (100 mg), Topamax (150 mg), and Trileptal (300 mg).

- Participant L is a 36 year-old female with an IQ of 61 and diagnoses of Mild MR, Mood Disorder NOS, Schizophrenia Paranoid Type, Impulse Control Disorder, Borderline Personality Disorder, and Seizure Disorder. Daily medications include Lithium Carbonate (300 mg), Abilify (20 mg), Neurontin (300 mg), Tegretol (400 mg), Remeron (15 mg), and Desyrel (50 mg).
- Participant M is a 23 year-old Female with an IQ of 76 and diagnoses of Borderline Intellectual Functioning, Borderline Personality Disorder, Bi-Polar, and ADHD. Daily medications include Abilify (30 mg), Trileptal (900 mg), and Lithium (300 mg).
- Participant N is a 31 year-old male with an IQ of 55 and diagnoses of Mild MR and Autism. He is currently on no medications
- Participant O is a 49 year-old female with an IQ of 66 and a diagnoses of Mild MR and Bi-Polar. She is prescribed Lithium (300 mg).
- Participant P is a 32 year-old male with an IQ of 59 and a diagnoses of Mild MR and Antisocial Personality Disorder. He is prescribed Prozac (10 mg).

Written consent was obtained from all participants as well as their guardians prior to the study. No compensation was given to any participant. The sessions took place at the participants' sheltered workshop. All participants were individually brought into a 35 foot by 45 foot conference room complete with a table, four chairs, and an HP Pavilion G series computer pre-loaded with Inquisit 4 and the delay discounting task introduction page on the screen. The evaluator and direct staff sat across from the participant for the entirety of the session.

Materials

All sessions were conducted on an HP Pavilon G laptop loaded with Inquisit 4 and the delay discounting task designed by Odum, Baumann, & Rimington, D.D. (2006). A Logitech wireless dual click mouse was used during all trials. Data was automatically tallied using Inquisit 4.

Procedure

One session (35 to 60 minutes long, 756 trials) was conducted with each participant. Before the sessions, participants were informed that the rewards were hypothetical and that they would not receive the rewards they chose. They were also told to choose the reward that they wanted and that there were no correct or incorrect responses. Participants were not informed of the purpose of the study, but were simply told that the researchers were interested in what rewards they would rather have. These procedures are similar to those that have previously measured delay discounting (Dixon, Marley, & Jacobs, 2003; Dixon & Holton, 2009).

After assenting to participate, all the participants were read the following instructions:

"Today I am going to ask you to make some choices about food and money. You will not get the money or food that you choose, but I want you to make your choices as though you were really going to get the food or money. The choice on the left of the screen shows the money or food you can have today. The choice on the right of the screen shows the money or food you can get

after you wait for some period of time. Click on the choice that you prefer until the screen stops giving you choices. "

All participants were given the option to read the following instructions on the introduction page to the delay discounting task: *I am going to ask you to make some decisions about which of two rewards you prefer. You will not receive the rewards that you choose, but we want you to make your decisions as though you were really going to receive these rewards you choose. The possible rewards will be displayed in two boxes on the screen. The box on your left displays a reward that you can get today. The box on the right displays the reward that you can get after the specified amount of time. So now you are being asked to choose between an immediate amount delivered today versus a delayed amount that you would get after waiting the delay interval. Click on the reward that you would prefer. The choices you make are completely up to you. Please select the option that you prefer, not what you think we want you to prefer. We do not expect you to choose one particular reward over the other. Just choose the one you really want.* After reading and listening to the script participants were required to click "continue" to move to the preference selection page. The preference selection page listed a choice of chicken nuggets, macaroni and cheese, chips, or candy (see Figure 1). The participant must click on the picture of the preferred food in order for the session to begin. The experimenter verbalized all steps to the participants during the first trial in an attempt to clarify expectations for the remaining trials. The prompted trial was not used for data collection or assessment. Trials started when hypothetical money and food amounts were presented automatically through the delay discounting task. The delayed reward was always 10 dollars or 10 servings (see Figure 2). Immediate reward amounts were varied across choice trails over the

following values: 10, 9.75, 9.50, 9.25, 9, 8.5, 8, 7.5, 7, 6.5, 6, 5.5, 5, 4.5, 4, 3.5, 3, 2.5, 2, 1.5, 1, .5 (see Figures 3 and 4). The delays were one day, two days, one week, two, weeks, one month, six months, and two years.

The participants were required to answer all questions at each of the seven delays in order for the session to be counted in the data assessment. After completing all the trials the last page would read: *Congratulations you have successfully completed the task. Please get the experimenter.*

For each participant, indifference points were calculated taking the average of the last immediate amount that was selected on the ascending cycle and the first immediate amount that was selected on the descending cycle at each of the seven delays. The discounting equation, k parameters, Area under the Curve (AUC), and Proportions of Variance Accounted by the Hyperbolic Model (VAC) were fit into Reed, Kaplan, & Brewers (2012) Delay Discounting Workbook using Excel 2010.

CHAPTER 3

RESULTS

Combined Food/Money Results

Table 1 shows the indifference points obtained at each of the eight delays for the offenders and control participants during the money condition. Table 2 shows the indifference points obtained at each of the eight delays for the offenders and control participants during the food condition. Theoretically, indifference points should decrease across each successive delay value. In general, the indifference points met the theoretical definition of discounting; however, there were numerous trails that deviate from the ideal pattern. On several occasions, indifference points remained the same across successive delays and on a few occasions actually increased. The latter pattern occurred equally across both the control and offender groups. Similar to Dixon et al (2003) for the present analyses, a participant's data was considered generally consistent with delay discounting if the indifference points decreased at least twice across successive delays and did not increase more than once across successive delay values. By these criteria the data from all participants across both conditions were considered consistent with delay discounting.

They hyperbolic equation developed by Mazur (1987) was fit into the delay discounting workbook developed by Reed et al. (2012). Participant C' s last five indifference points in the food condition was one serving for all delays longer than two days; and participant D's last four indifference points in the food condition was one serving or less for all delays longer than seven days. Thus, Participant C and D discounted the delays in the food condition steeply relative to

the other participants in their groups. However, due to the small sample size the data was included in group comparisons.

Derived discounting parameters (*k* values) and individual portions of variance (VAC) accounted for by the hyperbolic equation is displayed in Table 1 (money) and Table 2 (food). As seen with previous research, the *k* values for the target group, or the offenders in this study, should be higher versus the control group. A Wilcoxon rank-sum test (Dixon et al. 2003; Huck, 2000) was performed to determine if the ranks of the degrees of discounting (*k)* were significantly higher for participants who were offenders than those for the controls. Participant L's *k* score was significantly higher than the other participants in the control group across both the money and food conditions. This could be accounted for by the participant's diagnosis of impulse control disorder and further interpretations suggests that *k* scores have a strong correlation between impulsivity and the delay discounting task. The proportion of variance (VAC) accounted by the hyperbolic equation did not fall below .50 for any of the offenders. Thus, the hyperbolic model provided an adequate description of discounting for all available subjects. The difference in the sums of ranks of the discounting parameters (*k)* between groups was statistically significant when combining both money and food responses (W_S = 35, N1 =8, N2= 8*, p* <.05).

Area Under the indifference Curve (AUC), another measure of delay discounting, was also calculated for each participant. AUC is theoretically separate from the hyperbolic model with respect to the indifference curve and can adjust to accommodate a wider range of data than the hyperbolic model (Myerson, Green, & Warusawitharana, 2001). The AUC can range

from 0 (steepest discounting) to 1 (no discounting). Theoretically, the AUC should be lower for offenders than controls if offending is correlated with high degrees of delay discounting. The AUC means were .261 and .510 for the offenders and controls, respectively. The differences in the means from the two groups was statistically significant, $t(31) = 5.102$, $p < .001$, one-tailed t test.

Figures 8 and 9 show discounting curves for all participants in each group for both the money and food condition. A paired *t* test was conducted on the medians of the indifference points from the two groups and differences were statistically significant, $t(27) = 7.09$, $p < .05$.

Comparative Food versus Money Results

Figure 12 shows the total means of both the offender and control group comparing the food and money conditions. The present value of food decreased more steeply for food than money. For example, for the control group, $10 delayed by one day was worth $9.80 now, whereas 10 servings of food delayed by one day was only worth 9.31 servings now. Similarly, for the offender group, $10 delayed by one day was worth $9.47 now and 10 servings of food delayed by one day was only worth 9.44 servings now. Figure 13 shows the means of parameters for the money condition and Figure 14 shows the means of the food condition. The AUC's were smaller in the food condition using visual comparisons; there was no statistical difference in AUC scores between the money and food conditions for the offender group, $t(15) = 1.519$, $p > .05$., but there was a statistically significant difference in the control group or the control group $t(15) = 2.353$, $p < .05$. Surprisingly, no statistical relations were found when comparing *k* scores in the control group across both conditions, $t(15) = 1.718$, $p > .05$; however,

there was a statistically significant difference in the offender group t(15)= 2.340, p <.05. In addition, there was also no statistical relation found when comparing the VAC scores across both conditions for the offender group, t(15)= -.140, p > .05; however, the control group was found to have statistically significant differences, t(15)= -2.35, p <.05

CHAPTER 4

DISCUSSION

The present study used multiple measures of delay discounting to indicate that sex offenders discounted delayed rewards more steeply than the non-offending control group across two separate conditions. The hyperbolic equation provided a good fit for all individual indifference curves. The hyperbolic equation, using all participant data, derived that discounting parameters (*k* values) were significantly higher for offenders than matched controls. In addition, the mean of the individual AUC measures were significantly lower for offenders than for matched controls.

The findings that offenders discounted both monetary and edible rewards to a greater degree than did the non-offender control participants is consistent when compared to other impulsive populations, including pathological gamblers (Dixon et al., 2003), individuals with acquired brain injury (Dixon & Cummings, 2001), autism (Dixon & Falcomata ,2004), and individuals with AD/HD (Hoerger & Mace, 2006; Neef et al. 2005). In addition, the findings that both offenders and non-offenders discounted consumable rewards at a higher rate when compared to monetary rewards, is consistent with findings from previous results. For example, Odum et al. (2006) found that college students discounted food more steeply than money across small amounts of money ($10) and food ($10 worth of food) as well as for large amounts of money ($100) and food ($100 worth of food). In addition, Estle et al. (2007) showed that college students discounted candy, beer, and soda more steeply than money. Also, studies

measuring alcohol (Odum & Rainaud, 2003) and drug (Petry, 2001) consumption found similar discounting rates when comparing results to money.

The current best explanation for the question of why food is discounted more steeply than money is that money is exchangeable for desired items and is not directly consumed (Odum et al., 2006). Previous studies that found similar results in discounting rates across food and money could also suggest that directly consumable items may be steeply discounted because desire for a particular item may fluctuate over time, but delayed money can always be exchanged for needed items at that point (Odum et al., 2006). Results in this study could be manipulated due to the depravation levels for both money and desirable food for the control and offender participants. Due to individualized planning and team restrictions, individuals in the sheltered workshop setting rarely have access to significant amounts of money or highly desirable foods. The examiners attempted to mitigate this confounding variable by reducing amounts of rewards from previous delay discounting studies ($100-$1000) to accommodate the more restricted population in this study. Regardless of the mechanism, these results imply that sex offenders with disabilities have greater degrees of discounting when compared to a control non-offending comparative group.

This study was unique because the target populations (offenders) were assessed in a communal setting (workshop) across two reward conditions. Using both conditions increases external validity and allows for creative unique research in this area. For example, practitioners could use measures of delayed discounting before and after traditional treatment sessions to evaluate progress made in therapy. In addition, information gathered through delay

discounting tasks can help assess levels of impulsivity to make the scope of treatment more stringent and person centered.

Further studies could evaluate alternate settings, context, or deprivation levels (2 weeks prior versus pay day). Future studies could also evaluate interventions used to increase self-control and measures of delay discounting in participants. For example, Dixon et al. (2009) was successful in altering the magnitude of delay discounting in pathological gamblers by using conditional discrimination training. The training specifically followed match-to-sample stimuli formation using contextual cues to train "worse than" and "better than" discrimination with positive and negative consequences (chime and beep) and with no-feedback. The results of the study indicated that after conditional discrimination training all AUC values increased for the participants indicating that impulsivity to future discounting measures decreased and self-control increased.

These current methods may also be useful as a foundation for more precise clinical assessments for sex offenders. Using delay discounting measures as an additional risk-assessment tool can assist in identifying those who are most impulsive, those who need additional supports, and assist in designing person-centered treatments.

Applied behavior analysts have expressed concern over whether their field is focusing on a varying range of socially important problems (Critchfield & Kollins, 2001). These problems arise outside of residential settings, special education rooms, and laboratory like environments. There are currently over 250 articles in JABA exploring treatments of individuals with Autism and only 13 on pathological gambling, 3 on sex offenders, and 0 on individuals with bi-polar.

This study is an extension of previously used, non-traditional methods to incorporate the field into new domains and broaden the scope of traditional idealism of behavior analysis. Behavior analysts should continue to attempt to produce conceptually interpretable outcomes that are reconcilable with mainstream efforts in the field. Specifically, in the case of discounting, there is great potential for behavior analysts to affect diverse disciplines due to the increasing interest in discounting by cognitive, and social psychologists (e.g., Rachlin, 1989; Waltz & Follette, 2009), as well as behavioral (e.g., Madden & Bickel, 2010) and neuro-economists (Ayres, 2010).

Table 1

Indifference Points at Each Delay, Derived *k* Values, Proportions of Variance Accounted for by the Hyperbolic Model (VAC), and Areas under the Curve (AUC) for Offenders and Control Participants for the Money Condition.

	MONEY									
	Delay (Days)									
	1	2	7	14	30	180	730	*k*	*VAC*	*AUC*
Offenders										
A	9.25	9.25	7.5	8	7	5.5	1.5	0.008	0.8	0.424
B	10	7	5.5	2.5	1	1	1	0.156	0.935	0.11
C	8.5	7	7	4	4	1	0.5	0.082	0.905	0.128
D	9.25	5.5	2	3	2	1	0.5	0.281	0.869	0.1
E	10	9.5	8	7.5	6.5	5.5	4	0.005	0.468	0.512
F	10	10	9.5	9	7.5	4	2.5	0.008	0.974	0.399
G	9.75	9	9	9	8.5	6.5	4.5	0.002	0.818	0.604
H	9	6.5	7	7	6.5	2	1	0.03	0.751	0.223
Control										
I	10	9	9	8.5	6	4	3	0.011	0.844	0.399
J	9.75	9	8.5	8.5	8.5	7.5	6.5	0.001	-0.191	0.727
K	9.75	9	8.5	8.5	8.5	7	5.5	0.001	0.414	0.665
L	10	8	8.5	7	5	4	1	0.024	0.859	0.309
M	9.75	9	8.5	8.5	8.5	7.5	6.5	0.001	-0.19	0.726
N	10	10	9.5	9.25	8	7.5	5.5	0.001	0.785	0.686
O	9.5	8.5	7	8.5	7.5	4	2	0.01	0.814	0.376
P	10	10	9.5	9	8.5	6.5	5.5	0.001	0.77	0.643

Table 2

Indifference Points at Each Delay, Derived *k* Values, Proportions of Variance Accounted for by the Hyperbolic Model (VAC), and Areas under the Curve (AUC) for Offenders and Control Participants for the Food Condition.

FOOD

	Delay (Days)									
	1	2	7	14	30	180	730	*k*	*VAC*	*AUC*
Offenders										
A	10	9	6.5	5	3	1	1	0.07	0.984	0.138
B	9.5	8.5	5.5	2	1	1	0.5	0.148	0.949	0.09
C	9.5	7	1	1	1	1	1	0.317	0.851	0.104
D	8	3	2	1	0.25	1	1	0.589	0.827	0.094
E	10	9	8.5	7.5	7.5	6.5	4	0.003	0.539	0.571
F	10	10	8	7.5	5	4.5	4.5	0.014	0.384	0.466
G	8.5	9.5	7	5	1	1	1	0.084	0.925	0.116
H	10	8.5	6	3.5	1	1	0.5	0.115	0.961	0.093
Control										
I	10	10	9.5	8.5	8	5	3.5	0.004	0.921	0.489
J	8.5	8	7.5	7.5	5.5	5	4.5	0.01	-0.82	0.494
K	9	9	8	7	6.5	6.5	5	0.002	-0.73	0.6
L	10	9.5	7.5	3.5	4	1	1	0.066	0.939	0.148
M	8.5	9.5	8.5	7.5	6.5	6	6	0.002	-1.033	0.611
N	9.5	8.5	8.5	8	6.5	5.5	5	0.004	-0.029	0.55
O	10	9.5	7.5	7	6	4.5	3	0.015	0.667	0.419
P	9	9	8.5	7	5.5	3.5	2	0.022	0.875	0.329

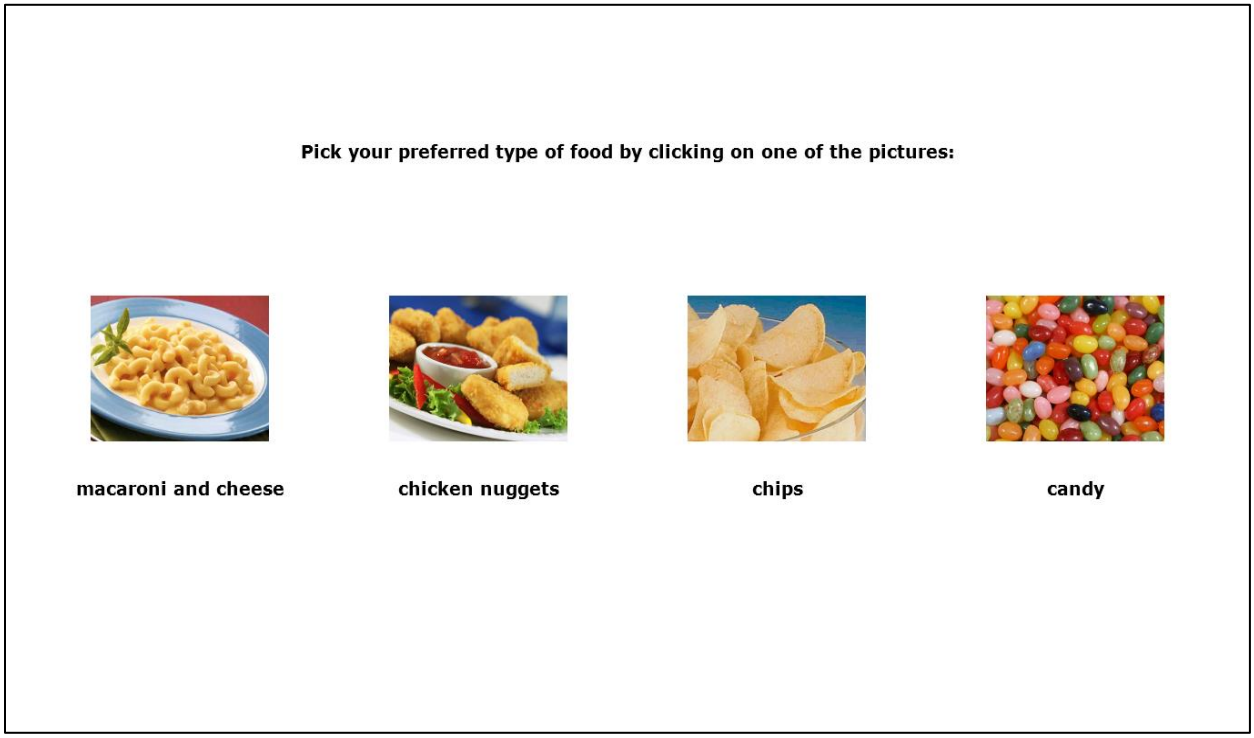

Figure 1: Food Preference Selection Page Shown to all Participants before Discounting Trials Began

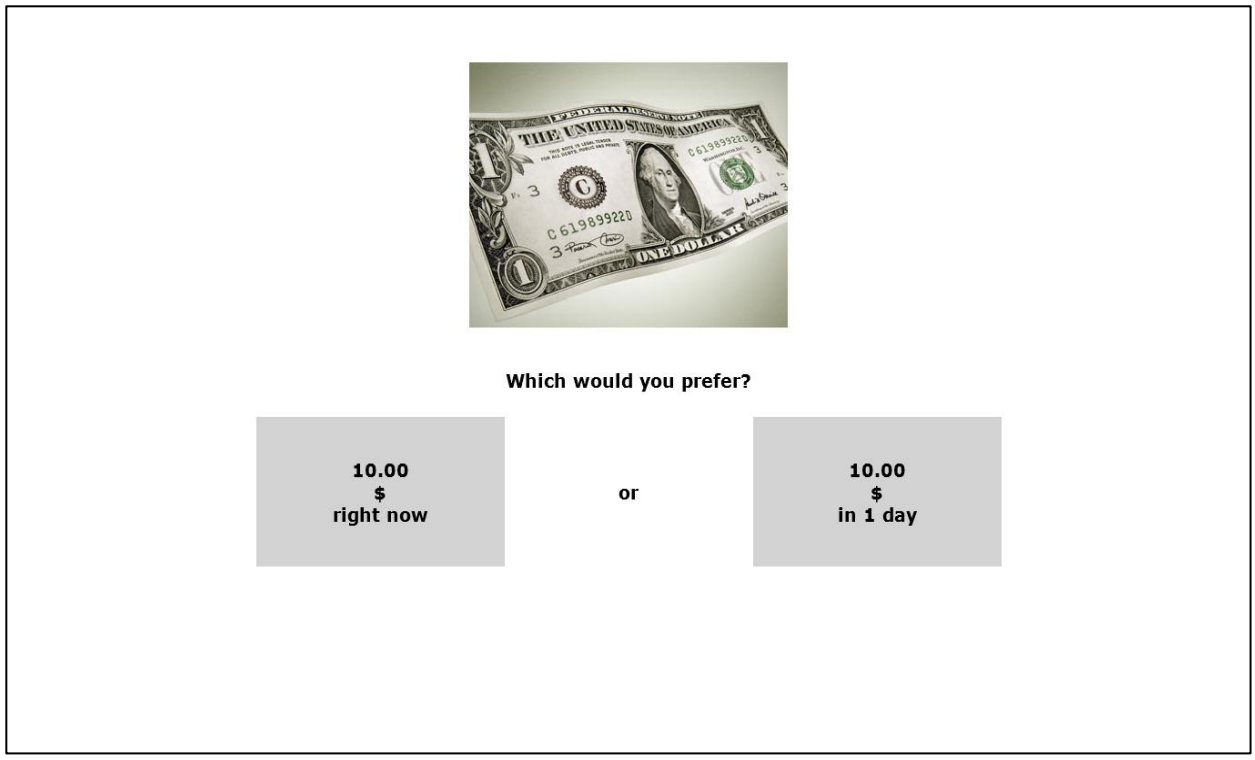

Figure 2: Screen shot of the first trial during the money condition. SSR is the box on the Left and the LLR is the box on the right.

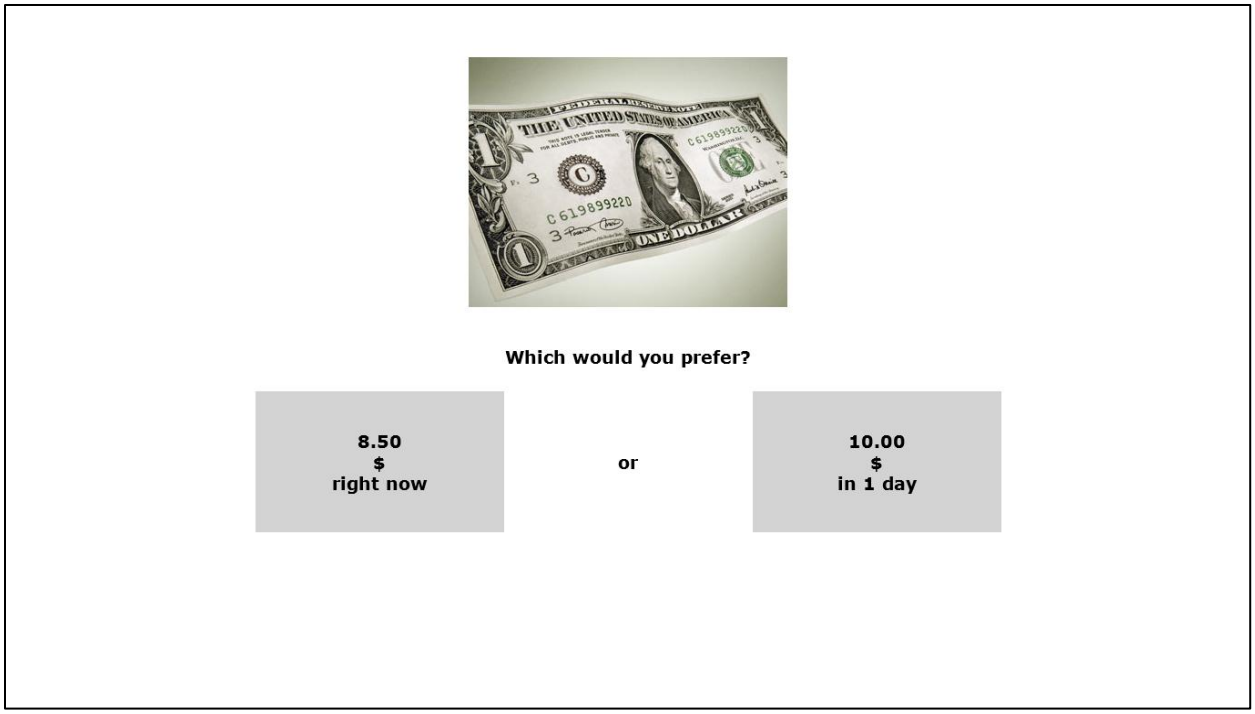

Figure 3: Delay discounting trial during the money condition. SSR has faded to $8.50

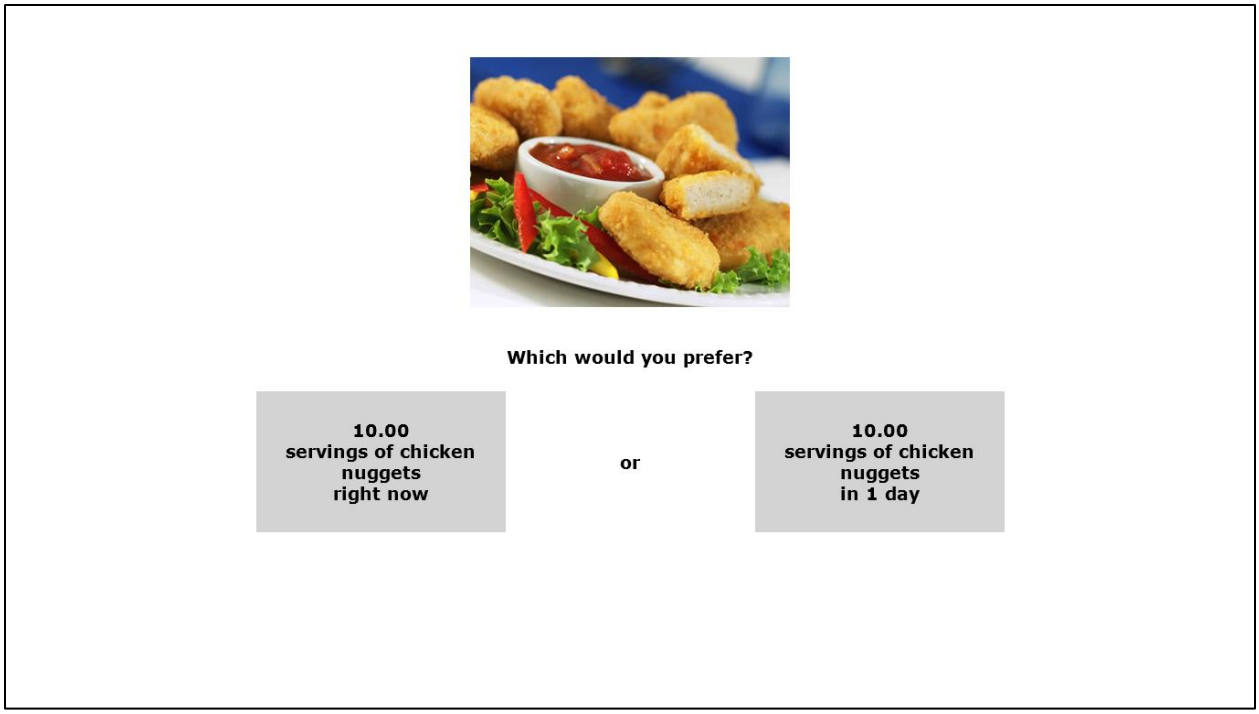

Figure 4: Screen shot of the first trial during the food condition. SSR is the box on the Left and the LLR is the box on the right.

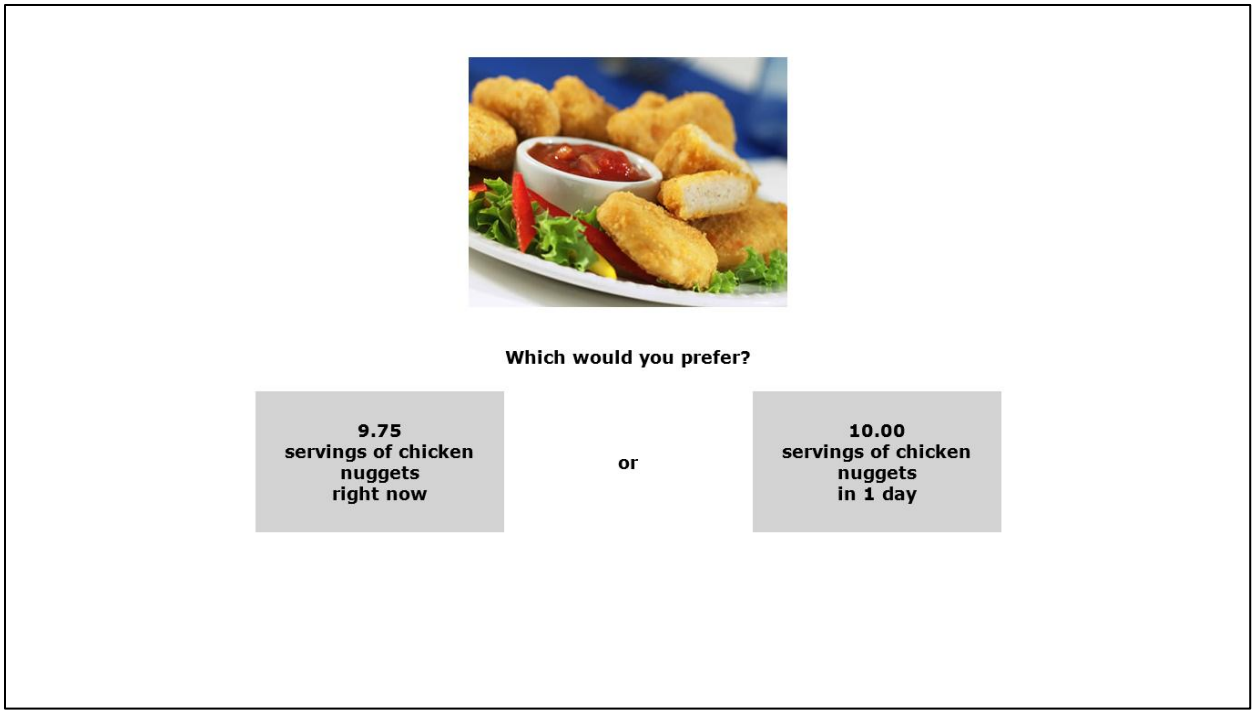

Figure 5:Delay discounting trial during the food condition where the SSR has faded to $9.75.

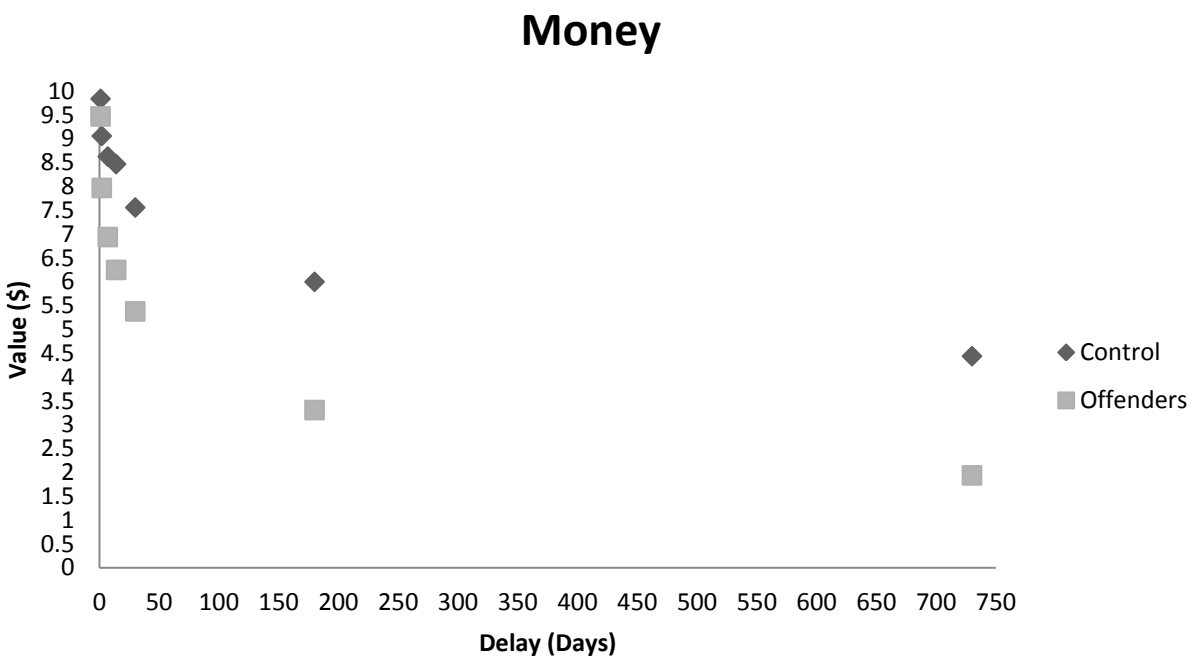

Figure 6: Indifference curves for offenders and control participants. Data points show medians of the individual indifference points for the money condition.

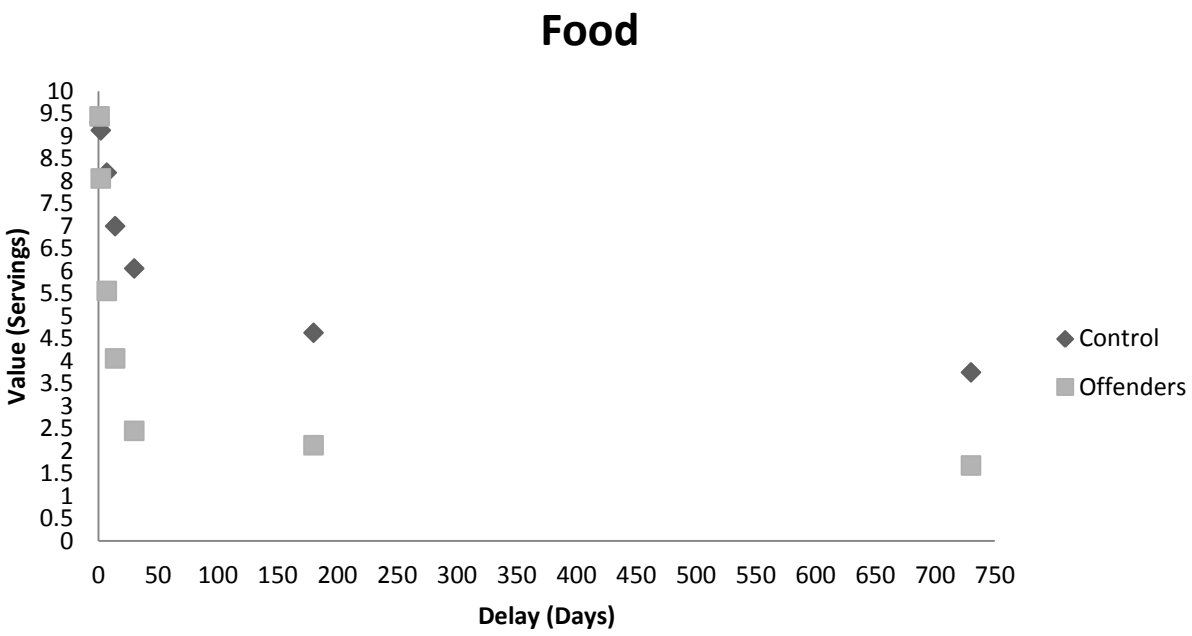

Figure 7: Indifference curves for offenders and control participants. Data points show medians of the individual indifference points for the food condition.

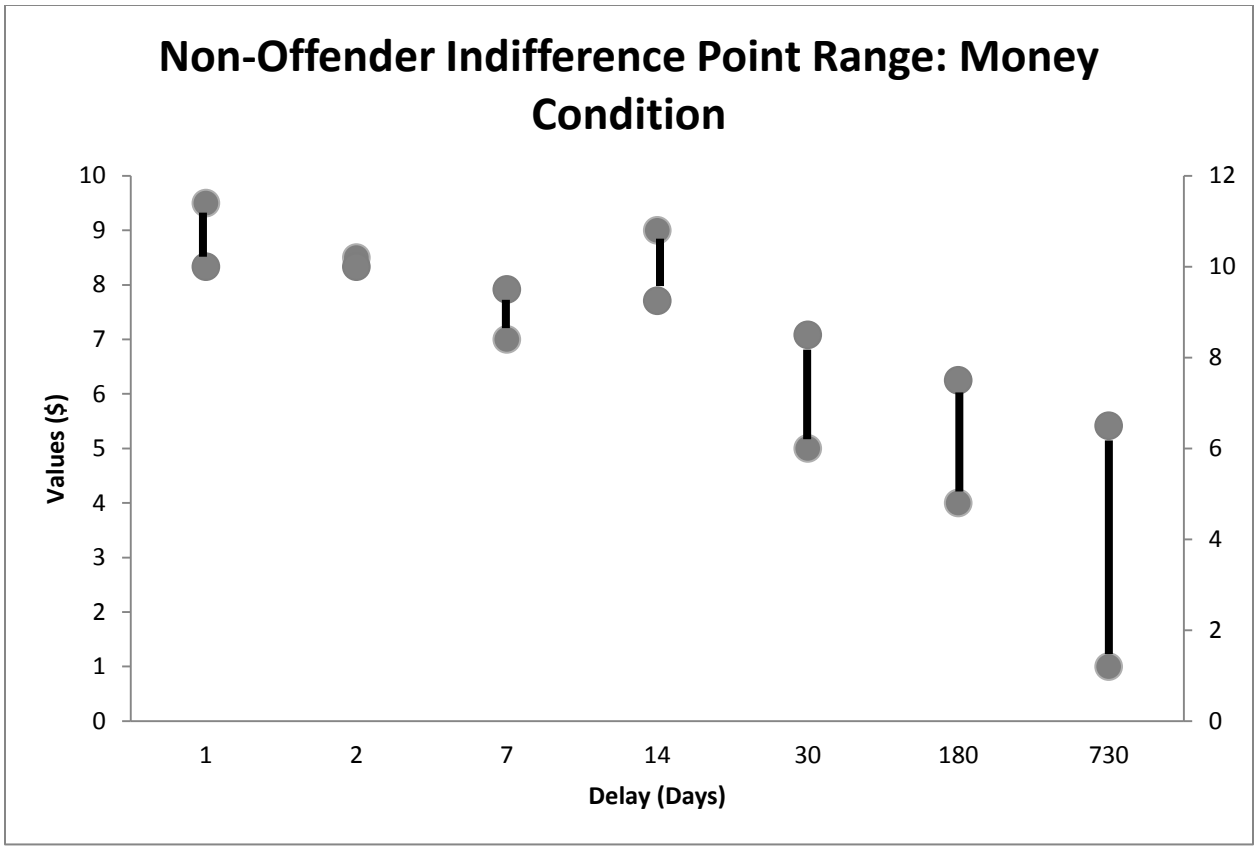

Figure 8: Indifference point range for non-offenders for the money condition. Data points show high and low values and error bars represent ranges.

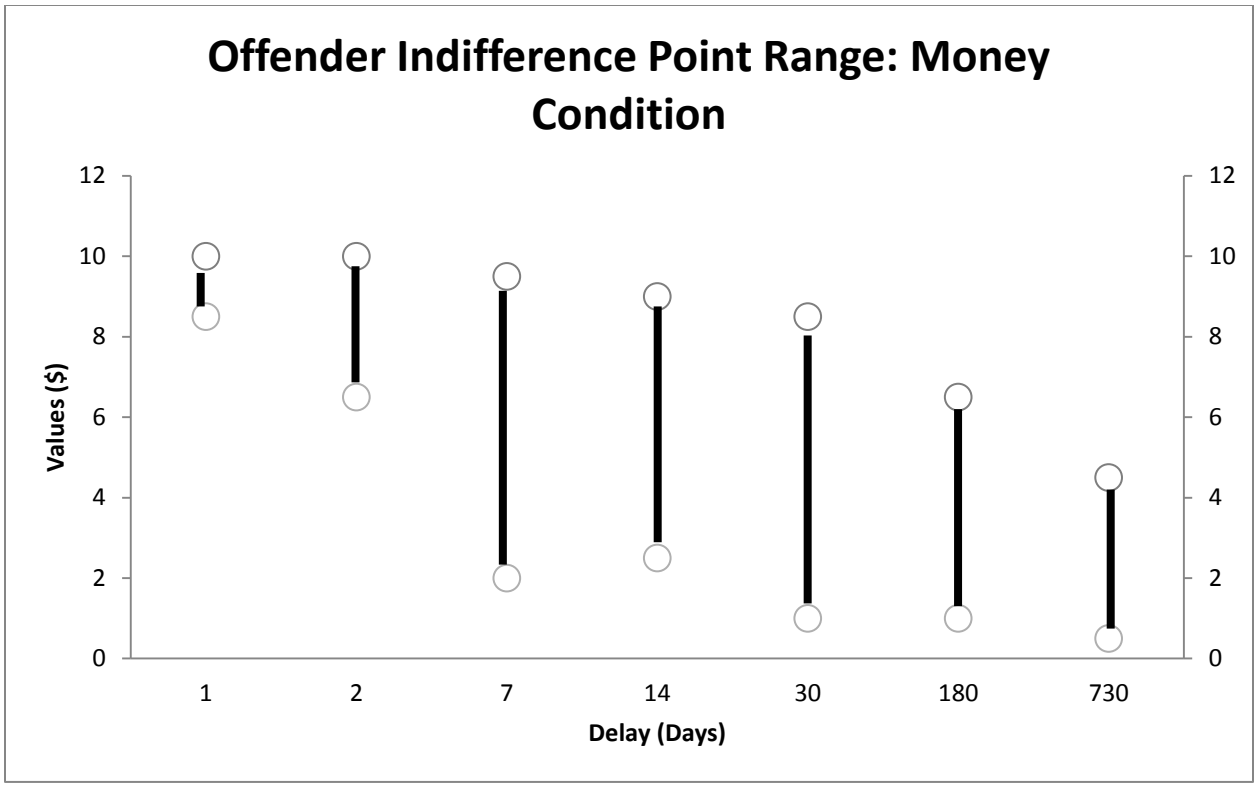

Figure 9: Indifference point range for offenders for the money condition. Data points show high and low values and error bars represent ranges.

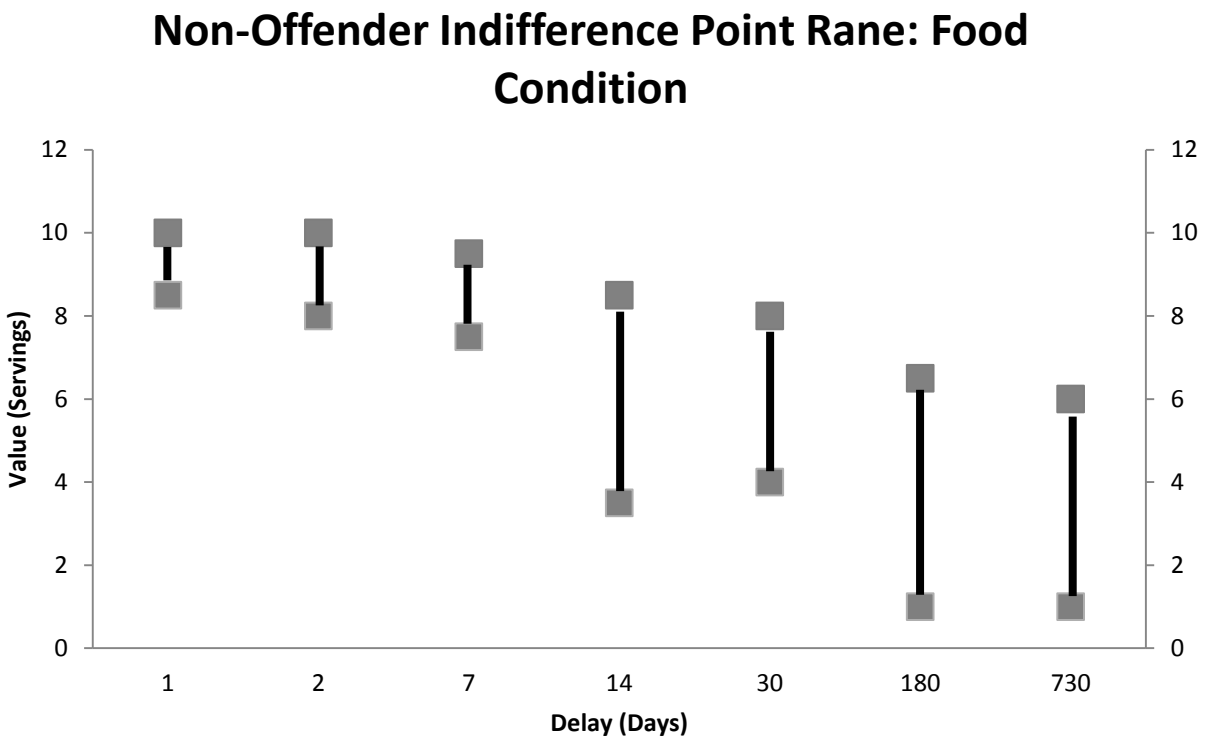

Figure 10: Indifference point range for non-offenders for the food condition. Data points show high and low values and error bars represent ranges.

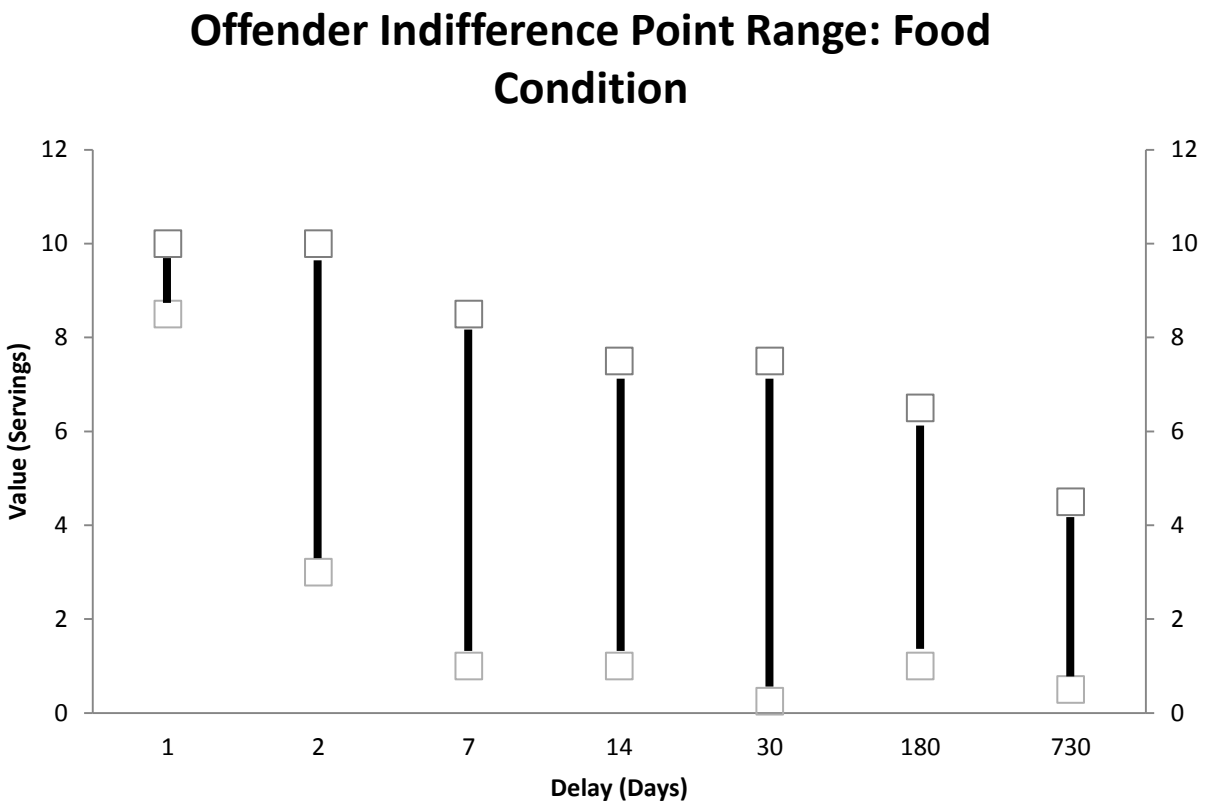

Figure 11: Indifference point range for offenders for the food condition. Data points show high and low values and error bars represent ranges.

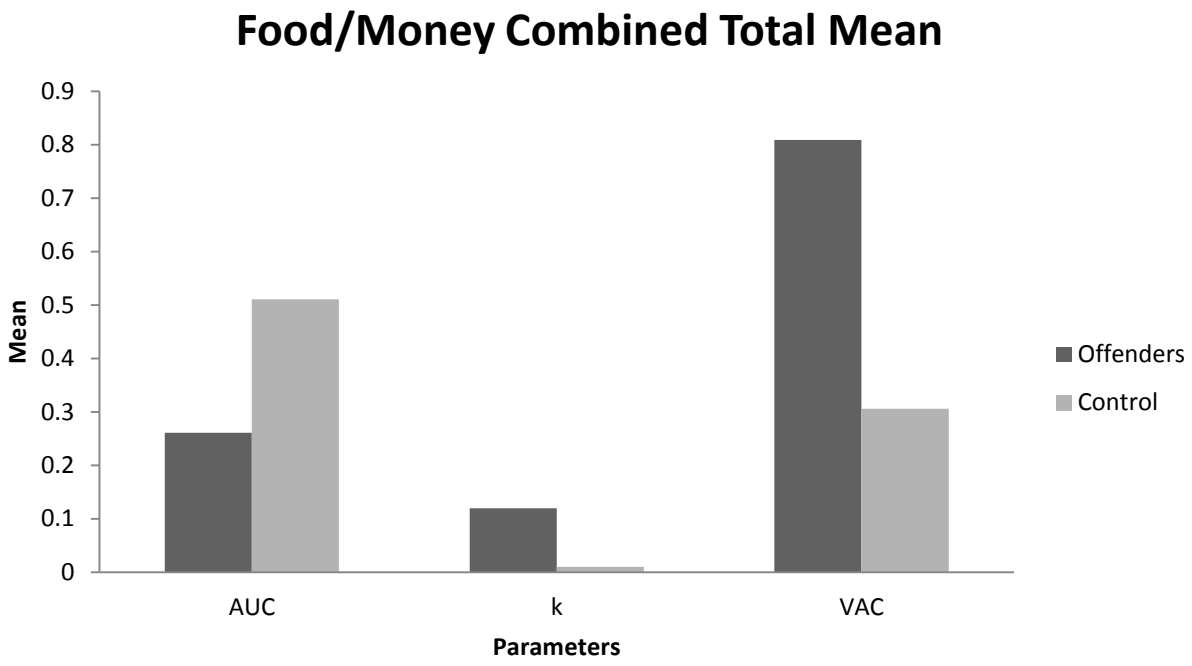

Figure 12: Combined (both money and food conditions) total means for both offenders and control participants. Means are distinguished across all parameters (AUC, *k,* VAC).

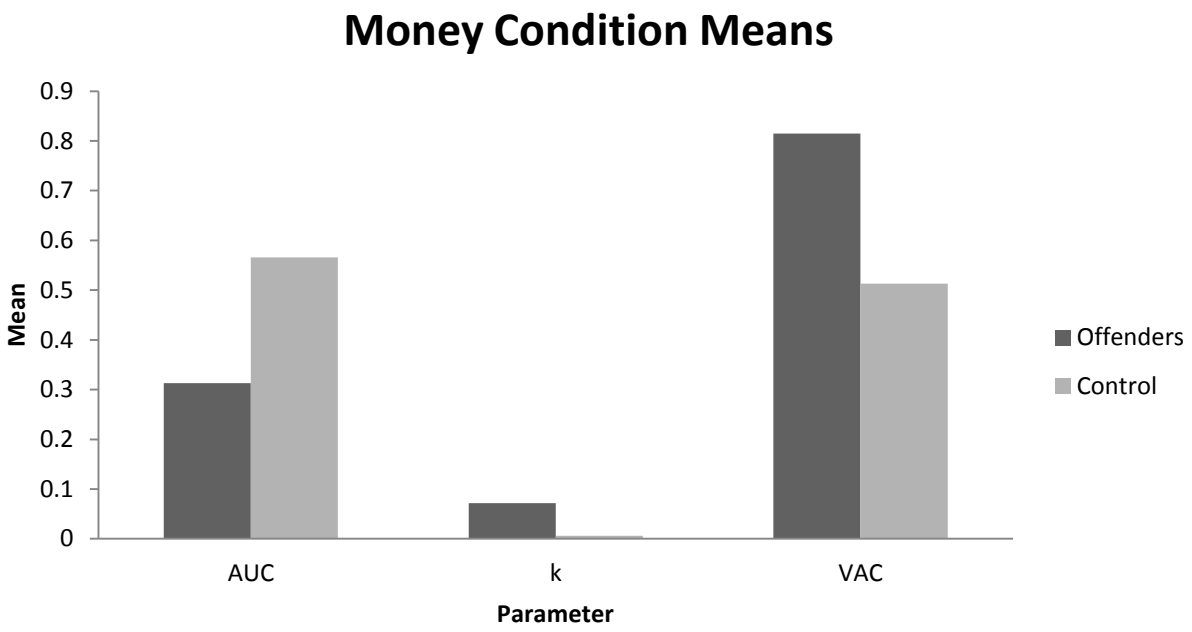

Figure 13 Means under the money condition for both offenders and control participants. Means are distinguished across all parameters (AUC, k, VAC).

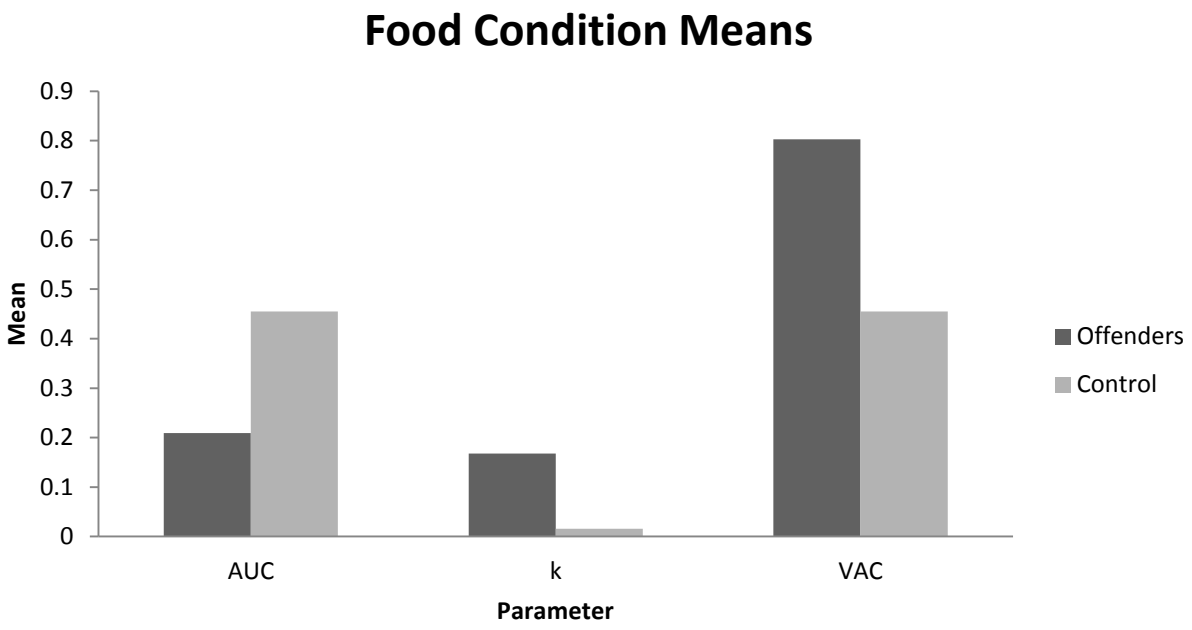

Figure 14: Means under the food condition for both offenders and control participants. Means are distinguished across all parameters (AUC, k, VAC).

REFERENCES

Archer, R. P.,Buffington-Vollum, J. K.,Stredny, R. V.,& Handel, R. W. (2006). A survey of psychological test use patterns among forensic psychologists. *Journal of Personality Assessment, 87*,84-94.

Ayers, I. (2010). *Carrots and sticks: Unlock the power of incentives to get things done.* New York: Bantam Books.

Barbaree, H.,Hudson, S.,& Seto, M. (1993). Sexual assault in society: the role of the juvenile offender. In H. Barbaree, W. Marshall, and S. Hudson (Eds.), *The Juvenile Sex Offender*: 10-11.

Bengtson, S. & Långstrom, N. (2007). Unguided clinical and actuarial assessment of re-offending risk: a direct comparison with sex offenders in denmark. *Sex Abuse, 19,* 135-153.

Boer, D.P.,Hart, S.D.,Kropp, P.R.,& Webster, C.D. (1997). Manual for the sexual violence risk – 20: professional guidelines for assessing risk of sexual violence. *The Mental Health, Law, and Policy Institute, 1,* 1-14.

Caputo, A. A. (2001). Community notification laws for sex offenders: Possible mediators and moderators of citizen coping. *Dissertation Abstracts International, 61*,(9-B).

Coffey, S. F.,Gudleski, G. D,Saladin, M. E.,& Brady, K. T. (2003). Impulsivity and rapid discounting of delayed hypothetical rewards in cocaine-dependent individuals. *Experimental and Clinical Psychopharmacology, 11,* 18-25.

Criminal Justice Agency. (2013). *Sex offender statistics* (On-line). Available: http://www.statisticbrain.com/sex-offender-statistics/

Critchfield, T. S. & Kollins, S. H. (2001). Temporal discounting: basic research and the analysis of socially important behavior. *Journal of Applied Behavior Analysis, 34,* 101-122

Dixon M. R. & Cummings A. (2001). Self-control in children with autism: Response allocation during delays to reinforcement. *Journal of Applied Behavior Analysis, 34,* 491–495

Dixon M.R. & Falcomata T.S. (2004). Preference for progressive delays and concurrent physical therapy exercise in an adult with acquired brain injury. *Journal of Applied Behavior Analysis, 37,* 101–105

Dixon, M. R. & Holton, B. (2009). Altering the magnitude of delay discounting by pathological gamblers. *Journal of Applied Behavior Analysis, 42,* 269-275.

Dixon, M. R.,Jacobs, E. A.,Sanders, S.,Guercio, J. M.,Soldner, J.,Parker-Singler, S.,Robinson, A., Small, S.,& Dillen, J. E. (2005). Impulsivity, self-control, and delay discounting in persons with acquired brain Injury. *Behavioral Interventions, 20,* 101-120.

Dixon, M. R.,Marley, J.,& Jacobs, E. A. (2003). delay discounting by pathological gamblers. *Journal of Applied Behavior Analysis, 36,* 449-458.

Estle, S.,Green, L.,Myerson, J.,& Holt, D. D. (2007). Discounting monetary and directly consumable rewards. *Psychological Sciences, 18,* 58-63.

Furby, L.,Weinrott, M.,& Blackshaw, L. (1989). Sex offender recidivism: A review. *Psychological Bulletin, 105 (*1), 3–30.

Green, L.,Myerson, J.,& Ostaszewski, P. (1999). Amount of reward has opposite effects on the discounting of delayed and probabilistic outcomes. *Journal of Experimental Psychology: Learning, Memory, & Cognition, 25,* 715-723.

Hanson, R. K.,Broom, I.,& Stephenson, M. (2004). Evaluating community sex offender treatment programs: A 12-year follow-up of 724 offenders. *Canadian Journal of Behavioural Science, 36,* 87-96.

Hanson, R. K.,Bourgon, G.,Helmus, L.,& Hodgson, S. (2009). The Principles of effective correctional treatment also apply to sexual offenders a Meta-analysis. *Criminal Justice and Behavior*, *36*(9), 865-891.

Hanson, K. R., Lloyd, C. D.,Helmus, L.,& Thornton, D. (2012). Developing non-arbitrary metrics for risk communication: percentile ranks for the static-99/R and static-2002/R sexual offender risk tools, *International Journal of Forensic Mental Health, 11:1*, 9-23.

Hanson R. K.,Morton-Bourgon, K. E. (2007). The accuracy of recidivism risk assessment for sexual offenders: a meta-analysis. *Public Safety and Emergency Preparedness Canada.*

Hanson, K. R.,Scott, H.,& Steffy, R. A. (1995). A comparison of child molesters and nonsexual criminals: risk predictors and long-term recidivism. *Journal of Research in Crime and Delinquency, 32,* 325-337.

Hanson, R. K. & Thornton, D. (2000). Improving risk assessments for sex offenders: A comparison of three actuarial scales. *Law and Human Behavior, 24*,119-136.

Hoerger, M. L. & Mace, G. J. (2006). A computerized test of self-control predicts classroom behavior. *Journal of Applied Behavior Analysis, 39,* 147-159

Huck, S. W. (2000). *Reading statistics and research* (3rd ed.) New York: Longman.

LaFond, J. Q. (2005).*Preventing sexual violence: How society should cope with sex offenders* Washington, DC: American Psychological Association.

Madden, G. J.,Begotka, A. M.,Raiff, B. R.,& Kastern, L. L. (2003). Delay discounting of real and hypothetical rewards. *Experimental and Clinical Psychopharmacology, 11,* 139-145.

Madden G. J. & Bickel W. K. (2010). *Impulsivity: The Behavioral and Neurological Science of Discounting*. Washington, DC: American Psychological Association.

Madden, G. J. & Johnson, P. S. (2010). A delay discounting primer. In G. J. Madden & W. K. Bickel (Eds.), *Impulsivity: The behavioral and neurological science of discounting* (pp. 1-37). Washington, DC: American Psychological Association.

Madden, G. J.,Petry, N.,Badger, G. J.,& Bickel, W. K. (1997). Impulsive and self-control choices in opioid-dependent patients and non-drug using control participants: drug and monetary rewards. *Experimental and Clinical Psychopharmacology, 5,* 256-262.

Marques, J.K.,Wiederanders, M,Day, D.M.,Nelson, C.,& Van Ommeren, A. (2005). Effects of a relapse-prevention program on sexual recidivism: Final results from California's Sex Offender Treatment and Evaluation Project (SOTEP). *Sexual Abuse: A Journal of Research and Treatment, 17,* 79-107.

Mazur, J. E. (1987). An adjusting procedure for studying delayed reinforcement. In M. L. Commons, J. E. Mazur, J. A. Nevin, & H. Rachlin (Eds). *Quantitative analyses of behavior: Vol. 5. The effect of delay and of intervening events on reinforcement value* (pp. 55-73). Hillsdale, NJ: Erlbaum

McNaughton, C.,Callanan, M.,Legard, R.,Tomaszewski, W.,Purdon, S.,& Webster, S. (2010). Examining implementation of the Stable and Acute dynamic risk assessment tool pilot in England and Wales. *Ministry of Justice Research Series 4, 10.*

Mossman, D. (2006). Another look at interpreting risk categories. *Sexual Abuse: A Journal of Research and Treatment*,*18*, 41-63.

Neef, N. A.,Mace, F. C.,& Shade, D. B. (1993). Impulsivity in student with serious emotional disturbance: the interactive effects of reinforcer rate, delay, and quality. *Journal of Applied Behavior Analysis, 26,* 37-52.

Neef, N. A.,Marckel, J.,Ferreri, S. J.,Bicard, D. F.,Endo, S.,& Aman, M.G. (2005). Behavioral assessment of impulsivity: A comparison of children with and without attention deficit hyperactivity disorder. *Journal of Applied Behavior Analysis, 38,* 23-37.

Odum, A.L.,Baumann, A. L.,Rimington, D.D. (2006). Discounting of delayed hypothetical money and food: Effects of amount. *Behavioural Processes, 73*, 278-284.

Odum, A. L. & Rainaud, C. P. (2003). Discounting of delayed hypothetical money, alcohol, and food. *Behavioral Process, 64,* 305-313.

Petry, N. M. (2001). Delay discounting of money and alcohol in actively using alcoholics, current abstinent alcoholics, and controls. *Psychopharmacology, 154,* 243-250.

Prevent Abuse Now. (2013). *Sex offender statistics* (On-line). Available: http://www.statisticbrain.com/sex-offender-statistics/

Quinn, J. F.,Forsyth, C. J.,& Mullen-Quinn, C. (2004). Societal reaction to sex offenders: A review of the origins and results of the myths surrounding their crimes and treatment amenability. *Deviant Behavior, 25,* 215–232.

Rachlin, H. (1989) *Judgment, decisions, and choice: A cognitive/behavioral synthesis.* New York: Freeman.

Rachlin, H. & Green, L. (1972). Commitment, choice, and self-control. *Journal of the Experimental Analysis of Behavior, 17,* 15-22.

Rachlin, H.,Raineri, A.,& Cross, D. (1991). Subjective probability and delay. *Journal of the Experimental Analysis of Behavior, 55,* 233-244.

Reed, D. D.,Kaplan, B. A.,& Brewer A. T. (2012). A tutorial on the use of excel 2010 and excel for mac 2011 for conducting delay-discounting analysis. *Journal of Applied Behavior Analysis, 45,* 375-386.

Rettenberger, M.,Hucker, S. J.,Boer, D. P.,& Reinhard, E. (2009) The reliability and validity of the sexual violence risk-20 (SVR-20): an international review. *Sexual Offender Treatment, 4,* 2.

Reyes, J. R., Vollmer, T. R., & Hall, A. H. (2011). Replications and extensions in arousal assessment for sex offenders with developmental disabilities. *Journal of Applied Behavior Analysis, 44,* 369-373.

Reyes, J. R.,Vollmer, T. R.,& Hall, A. H. (2011). The influence of presession factors in the assessment of deviant arousal. *Journal of Applied Behavior Analysis, 44,* 707-717.

Reyes, J. R.,Vollmer, T. R.,Sloman, K. N., Hall, A., Reed, R., Jansen, G., Carr, S., Jackson, K., & Stoutimore, M. (2006). Assessment of deviant arousal in adult male sex offenders with developmental disabilities. *Journal of Applied Behavior Analysis, 39,* 173-188

Sample, L. L. (2001). The social construction of the sex offender. Unpublished Dissertation.

U.S Department of Health and Human Services. (2011). *Child Maltreatment* (On-line). Available: http://www.acf.hhs.gov/programs/cb/publications/cmreports.htm

Vollmer, T. R., Borrero, J. C.,Lalli, J. S.,& Daniel, D. (1999). Evaluating self-control and impulsivity in children with severe behavior disorders. *Journal of Applied Behavior Analysis, 32,* 451-46

Wakefield, H.,& Underwager, R. (1991). Sex offender treatment. *Issues in Child Abuse Accusations, 3,* 7-13.

Waltz T.J,Follette W.C. (2009). Molar functional relations and clinical behavior analysis: Implications for assessment and treatment. The Behavior Analyst, 32, 51–68.

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Thesis Title:

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Major Professor: Mark R. Dixon