Delay Discounting and Forms of Aggression Exhibited by Forensic Inpatients

by

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Dedication

To my family. I could not have asked for better antecedent conditions. Growing up in a loving and nurturing environment has inspired me to help those who may not be as fortunate as I have been. I could not have made it thus far without your care and generosity. Thank you, Mom, Nanna, Poppa, Rodger, Brenda, Wendy-Anne, Sarah, Brad, Hailey, Hanna, and Brittany, for all of your support along the way.
Abstract
Inpatients with complex mental illness who are found Not Criminally Responsible on Account of Mental Disorder (NCRMD), may engage in aggression while receiving recovery and rehabilitation treatment services. Inpatient aggression may be detrimental for staff and clients within a therapeutic environment. Client aggression may affect staff through physical injury and emotional trauma. Clients who engage in steep delay discounting, or more impulsive behaviour, involving selection of smaller sooner rewards, versus larger later outcomes, may be more likely to display aggression. This pilot study involved participants (N = 16) diagnosed with complex mental illness. Subjects resided on minimum or medium secure units in a forensic rehabilitation setting. The aim of the current study was to evaluate the relationship between delay discounting k scores, as measured by the Monetary Choice Questionnaire (MCQ; [Kirby, Petry, and Bickel, 1999]), and aggression in the forms of verbal intimidation or threats, physical aggression towards property or furniture, and physical aggression towards others, as recorded on the Dynamic Appraisal of Situational Aggression – Inpatient Version (DASA-IV; [Ogloff and Daffern, 2006]). Pearson correlation analyses did not reveal statistically significant correlations between inpatient delay discounting k scores from the MCQ, and aggressive incidents. These results suggest that the ability to delay gratification, and to select immediate, monetary rewards may not have a direct impact on the forms of aggression exhibited by this inpatient sample. Secondary findings revealed some statistically significant correlations between scores on the Psychopathy Checklist Revised (PCL-R; [Hare, n.d.]) and some forms of aggression. Results indicated that inpatients with high scores on the PCL-R may be more likely to engage in some forms of aggression. Implications for future research include further examining the relationship between delay discounting and aggression with a more normal distribution of k scores.
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Chapter I: Introduction

Forensic Mental Health System

Individuals with complex mental illness who engage in unlawful activity may be debilitated by their mental illness at the time of the index offense. These individuals are likely deemed Not Criminally Responsible on Account of Mental Disorder (NCRMD) and may receive a verdict to be treated and rehabilitated for their mental illness. Mossière and Maeder (2016) explained that in Canada, if an individual is found NCRMD, this is because the individual was unable to understand the nature of the offense. Mossière and Maeder noted that a person who is NCRMD may be incapable of discriminating between right versus wrong at the time of the offense.

As a result of impaired functioning, individuals with complex mental illness may come into contact with the law. Complex mental illness includes diagnoses of schizophrenia, bipolar disorder, schizoaffective disorder, and personality disorders. A diagnosis of schizophrenia may be categorized by symptoms such as the presence of delusions, hallucinations, disorganized thought or speech, as well negative symptoms including little emotional and facial expression and diminished interest in activities (American Psychiatric Association, 2013). In accordance with these symptoms of schizophrenia, a major manic or depressive mood is likely to yield a diagnosis of schizoaffective disorder (American Psychiatric Association, 2013). While the symptoms of bipolar disorder can present as episodes of mania which can include sense of grandiosity, difficulties with sleep and increase in behaviours such as talking and engagement in activities; this may also include episodes of major depression which may be characterized by lack of interest in activities, sense of guilt, as well as insomnia, fatigue, and difficulty concentrating or making decisions (American Psychiatric Association, 2013). According to American Psychiatric Association (2013), there are a variety of personality disorders with different criteria for each diagnosis; however, to constitute as a personality disorder, an individual will exhibit symptoms such as rigid and persistent behaviours, deviance from the individual’s culture, and is detrimental to functioning. Some individuals with complex mental illness may engage in antisocial personality traits or have a tendency to display characteristics of psychopathy. The Psychopathy Checklist Revised [PCL-R; Hare, (n.d)] is a measure of traits of psychopathy used with forensic inpatients. Hogan and Olver (2016) explained that the PCL-R examines interpersonal characteristics as well as antisocial behaviours. Hogan and Ennis, as cited in Hogan and Olver (2016), noted that the purpose of the PCL-R is not to predict violence; however, they explained that the PCL-R was successful at predicting risk of violence and aggression within the forensic mental health setting.

Patient Aggression

According to Brugman et al. (2016), staff working in a forensic setting frequently encounter incidents of aggression. Morrison et al. (2002) explained that regardless of the level of security within a forensic unit, incidents of violence continue to occur. Aggression can be categorized as physical aggression towards others, physical aggression towards property or furniture, and verbal intimidation or threats of harm towards others. Acts of aggression and violence may be detrimental to patient treatment and care plans. The study by Morrison et al. explained that staff in a psychiatric setting experienced being spat on, punched, attacked by patients, or were the victims of sexual indiscretion. Some staff experienced emotional trauma and staff injury as a result of violence exhibited by patients (Rice and Harris as cited in Morrison
et al. 2002). Morrison et al. noted that staff may have been afraid to deal with certain clientele, and that the staff may have minimal drive or motivation, call in sick to work, or go into early retirement. The authors also found that nursing staff were concerned with the violent attacks from patients, led to minimal staff on shift, as a result of those who called in sick, which led to nursing staff working overtime hours. Morrison et al. explained that these factors contributed to unorganized and unproductive multidisciplinary meetings.

Novaco and Taylor (2015) explained that violent or aggressive behaviour within forensic inpatient units has a number of detrimental implications including damaging effects to the client’s treatment, staff health and safety, as well as an impact on the finances of the agency with regards to compensation for staff for injury or sick days. Novaco and Taylor also explained that patient violence may result in increased length of stay in the treatment facility. Similarly, Daffern, Mayer, and Martin (2003) explained that aggression can be costly to the agency in a financial sense and can also be detrimental to the dynamic of the forensic unit. Daffern et al. (2003) noted that when compared to other disciplines, nursing staff working in forensic hospital settings were more likely to be the target of violence or physical aggression, while other staff members were more likely to experience verbal aggression. Daffern et al. also noted that aggression has an impact on staff members, other clients, and also affects the agency.

**Delay Discounting**

Delay discounting provides a basis for decision making and depicts how an individual might weigh costs versus benefits. According to Friedel, DeHart, Frye, Rung, and Odum (2015) the level at which a small, immediate reward and a large, delayed reward are equal in value is known as the indifference point. This can be reflected through an example such as an individual who selects $150.00 now rather than $200.00 in a month, however the individual may switch to choose $200.00 in a month if the immediate value decreases to $120.00. According to Towe, Hobkirk, Ye, and Meade (2015), selection of a smaller, immediate outcome in comparison to a larger outcome to be delivered later reflects delay discounting. Towe et al. (2015) noted that individuals who are exhibit impulsive behaviour are likely to select a smaller outcome to be delivered sooner. They also explained that individuals who delay discount at a high rate may engage in substance use or other behaviours hazardous to health. They explained that a significant part of decision making involves the rate at which an individual discounts the value of an outcome based on delay to receiving the reward. Towe et al. noted that an individual may engage in behaviour to elicit an immediate reward instead of engaging goal driven behaviour to support long-term outcomes.

Vanderveldt, Oliveira, and Green (2016) explained delay discounting as a negative relationship between time and value of an outcome. They explained that as time or delay to obtaining a reward increases, the value of the reward decreases. Similarly, MacKillop et al. (2011) explained that with delay, the value of a reward decreases, while the same reward may gain value when delivered more immediately. The authors noted an example of individuals with substance use disorders who may choose short-term reward from the effects of drug use rather than selecting long-term benefits of abstaining from the drug use. Friedel, et al. (2015) also noted that if an individual engages in steep delay discounting when decision making, the individual is likely to apply this type of impulsive decision making to other situations and outcomes. Steep delay discounting involves more preference towards immediate outcomes and discounting delay at a high rate. Sheffer et al. (2016) explained that individuals who engage a high-level, or steep
delay discounting, are more likely to display undesirable behaviours, while those who engage in shallow discounting delayed outcomes may experience more successful treatment.

Inpatients in a forensic hospital may engage in aggressive behaviour towards staff, property, or others as a result of impaired functioning and complex mental illness. This can lead to detrimental effects on client treatment and care, as well as concerns surrounding the health and safety and staff members and co-patients. The study that is the subject of this thesis has the potential to lead to implications for interventions supporting self-control, and self-monitoring, weighing costs versus benefits, and long-term planning. These future interventions may yield results such as client rehabilitation and progression through the forensic system, as well as a decrease in financial loss for the agency, as staff health and safety increases. The study may show that aggressive behaviour is linked to the decision-making process; specifically, the rate at which one engages in delay discounting.

The aim of this study is to answer the following questions regarding forensic inpatient scores on a monetary delay discounting questionnaire, in relation to different forms of aggression exhibited by inpatients: (1) Are scores reflecting low-rates of delay discounting related to verbal intimidation or threats? (2) Are scores reflecting moderate-rates of delay discounting related to physical aggression towards property? (3) Are scores reflecting high-rates of delay discounting related to physical aggression towards others?

The chapters covered in this thesis include the introduction, review of empirical literature, methodology, results, and discussion. The introduction provides an overview of the client population of forensic inpatients, and the variables examined including patient aggression and delay discounting. The literature review displays presentation and critical analysis of existing studies involving similar measures to those used in the current study. The method describes the measures used in the study including the Dynamic Appraisal of Situational Aggression Inpatient Version (DASA-IV) as a measure of client aggression, and the Monetary Choice Questionnaire (MCQ) to examine delay discounting rates regarding hypothetical monetary outcomes. The results section displays the data collected through the study, a statistical analysis of the data, as well as tables and figures to visually represent the data. The discussion evaluates the results in relation to the research questions, and identifies limitations to the current study and its contribution to the field, as well as implications for future research.
Chapter II: Literature Review

Evaluating Delay Discounting

In a study by Green, Myerson, Oliveira, and Chang (2013), 59 university students participated in selecting hypothetical monetary outcomes via computer-based software. Green et al. explained that the participants were given instructions by the researcher to choose between the 2 amounts offered which involved a smaller outcome immediately, versus a larger outcome later. They noted an inverse relationship between the degree to which the participants engaged in delay discounting in relation to the value of the reward.

Similarly, Shead and Hodgins (2009) conducted a study to examine the risk-taking behaviour of 60 participants who were university students. They analyzed risk-taking behaviour through probability discounting and delay discounting. Shead and Hodgins explained that probability discounting involves questions with certain outcomes as well as probabilistic outcomes and that the participants are likely to value the certain outcome more than the probabilistic outcome. Risk-taking behaviour can be demonstrated through participant responses to probability discounting questions as responses pertaining towards uncertainty, or the probabilistic outcomes reflect more risk-taking than those who select the certain outcomes (Shead and Hodgins, 2009). Shead and Hodgins explained that the delay discounting involves the likelihood that an individual will select a more immediate reward as opposed to a delayed reward. They also noted that an aim of the study was to examine the relationship between delay discounting and probability discounting. Through review of various past studies, Shead and Hodgins concluded that delay discounting and probability discounting were likely to be positively correlated. Shead and Hodgins hypothesized that this may be because individuals who engage in higher rates of risk taking behaviour and selection of probabilistic outcomes over certain outcomes are also likely to select immediate rewards versus a reward after a period of delay.

In their study, the participants were presented with delay discounting and probability discounting tasks via computerized software. They gave the participants questions regarding hypothetical monetary outcomes; however, they noted that a question would be randomly selected at the end of each task, and the participants would receive real monetary compensation based on their response to said question. Facilitating an environment in which the participants are blind to which of their responses will yield a real versus hypothetical outcome will likely influence participants to respond as if all questions will result in real outcomes (Kirby and Herrnstein as cited in Shead and Hodgins, 2009). Shead and Hodgins sought to evaluate the relationship between delay discounting and probability discounting, as they explained that this relationship may provide insight into impulsive behaviour.

They found that there was no significant correlation between delay discounting and probability discounting. They concluded that these results do not support the notion that probability discounting and delay discounting are both related to impulsive behaviour. To speculate, these results may be reflective of the sample population. University students may be more skilled at selecting delayed outcomes as opposed to immediate outcomes, as these students enroll in a post-secondary school program with the knowledge that gratification will be delayed over a period of years until receipt of a university degree. Whereas a sample population of
individuals with a history of substance abuse, developmental disabilities, or individuals of a different age group may not exhibit the same skill of selection of delayed rewards.

A study by Bridge et al. (2015) examined delay discounting and impulsive aggression in 40 adolescents with a history of suicide attempts and a control group of 40 adolescents with no history of suicide attempts or suicidal ideation. They noted that although not all of the participants had engaged in suicidality, all participants were outpatients receiving treatment for mental health or behavioural concerns. They explained that participants completed a computer-based delay discounting questionnaire. Bridge et al. noted that the questions involved selection between a small immediate reward and a large delayed reward. Similar to the study by Kirby and Herrnstein as cited in Shead and Hodgins, Bridge et al. explained to participants the importance of each of their selections on the discounting task as a randomly selected question would yield a real monetary reward based on their response to the question. Bridge et al. conducted a Spearman’s rank correlation test to examine the relationship between impulsive aggression and delay discounting. They found that there was no statistically significant correlation between impulsive aggression and delay discounting. They also noted that there was no statistically significant difference in delay discounting of participants with a history of suicide attempts in comparison to the control group. However, Bridge et al. found a relationship between family history of suicide attempts and participants who engaged in higher rates of discounting. They explained that some limitations to this study included that all participants were receiving outpatient treatment at the time of the study and most of the patients were receiving psychotropic medication. Bridge et al. noted that some limitations within the sample could be that only 60% of the suitable population was examined, and that there were few male participants in the study. Overall, though the authors did not find a statistically significant relationship between aggression and delay discounting, a number of factors that can be taken into consideration for this include participant receipt of behavioural treatment as well as psychotropic medication, simultaneously with the study. Although it was hypothesized that individuals who have a history of suicide attempts may be more likely to engage in higher rates of delay discounting and impulsive aggression, exhibition of these behaviours may be incompatible with treatment.

Kirby, Petry, and Bickel (1999) conducted a study to compare the delay discounting rates of adults who used substances to adults who did not use substances in regards to monetary outcomes. Kirby et al. noted that the study had a sample of 56 outpatients who were receiving treatment for substance abuse, while the control group consisted of 60 individuals with no history of substance abuse. Kirby et al. explained that the participants completed 27 questions on the Monetary Choice Questionnaire (MCQ). They noted that the participants were to make a decision based on preference of receiving a small immediate reward, or a larger reward after a period of delay. Kirby et al. found that the patient group delay discounted at a steep rate in comparison to the control group. They further elaborated that the mean $k$ values for each group demonstrated that the patient group delay discounted at a higher rate than the control group. The $k$ value represents the degree to which an individual engages in delay discounting, consequently a high $k$ value would indicate a steep discounting rate, while a low $k$ value would indicate a shallow rate of discounting (Odum, 2011).

Demurie, Roeyers, Baeyens, and Sonuga-Barke (2012) examined a control group of typically developing children in comparison to a group of children with diagnoses of attention deficit hyperactivity disorder (ADHD), as well as a group of children diagnosed with autism spectrum disorder (ASD). Demurie et al. noted that the children who were diagnosed with ASD and ADHD were outpatients of various agencies. They noted that the participants completed
hypothetical, monetary discounting tasks through a computer-based program. According to Demurie et al., the computer program delivered questions involving selection of receiving a small reward immediately or a large reward at a later time. They noted that these tasks were to examine the extent to which the participants engaged in temporal discounting, which involves the negative relationship between the perceived value of the reward or outcome and the delay to receipt (Critchfield and Kollins as cited in Demurie et al., 2012). Demurie et al. found that in comparison to typically developing children and children with ASD, children with ADHD delay discounted at a higher rate. They found that the group with ASD and the control group delay discounted at the same rate. Demurie et al. concluded that further research should be conducted with the use of real rewards as hypothetical outcomes yield similar results however, may not be as reliable a measure of delay discounting in comparison to real rewards.

Green, Myerson, and Ostaszewski (1999) conducted a study with 44 participants to examine discounting behaviour in relation to different ages. They explained that among the participants were 3 different age groups consisting of 12 children, 12 young adults, and 20 older adults. Green et al. noted that the participants were to select hypothetical monetary outcomes in relation to receiving $1000.00 after a period of delay, or smaller increments of money immediately. They presented each outcome on an index card with the immediate reward displayed on the left and the delayed reward displayed on the right. Green et al. found there to be a negative correlation between age and the k value. They concluded that as age increased, individuals engaged in lower rates of delay discounting.

Rachlin, Raineri, and Cross (1991) also used cards to present participants with various delay discounting outcomes. Rachlin et al. conducted 2 studies regarding delay discounting and probability discounting. They noted that the first research study involved 80 university students who agreed to participate in the study. They explained that participants were instructed to select between the hypothetical amount of $1000.00 was available after a period of delay, or various smaller amounts to be delivered immediately. Rachlin et al. conducted a second, similar experiment with 40 university students. They explained that cards were again presented to the participants with immediate, uncertain rewards versus certain rewards to be delivered after a period of delay. Through these studies, Rachlin et al. determined that it is likely that delay discounting may be related to aspects of self-control.

Johnson and Bickel (2002) administered a computer-based system to examine the monetary outcome selections of 6 adult participants. They explained that the questions involved selection of a smaller sooner reward or a larger later reward. Johnson and Bickel noted that the participants were informed that some of the questions were hypothetical, while others would yield real monetary outcomes. They found that as the reward gained magnitude, the degree of delay discounting decreased. They also concluded that the participants answered similarly, regardless of whether the outcome was noted to be hypothetical or real. Johnson and Bickel explained that their study supports the efficacy of use of hypothetical outcomes when conducting research related to delay discounting, although they noted that attention should be given to results obtained through hypothetical monetary outcome selection as these may not be as reliable as results obtained from real monetary outcome selection.

Similarly, a study by Sheffer et al. (2016) involved 1,122 participants aged 18 and older who were recruited through an online, computer platform. Data collected included demographic factors such as age and sex, as well as other measures involving participant completion of a questionnaire regarding monetary outcomes such as a smaller reward delivered immediately versus a larger reward delivered after a period of delay (Sheffer et al., 2016). Among the
variables that were analyzed, Sheffer et al. found statistical significance in the negative relationship between self-monitoring and delay discounting. They noted that level of education was also negatively correlated with delay discounting, while cigarette smoking and delay discounting were positively correlated.

Du, Green, and Myerson as cited in Friedel, et al. (2015) noted that the level to which and individual discounts outcomes based on delay may be measured through posing a series of questions in which the individual is to make a decision between two outcomes. The authors explained that the outcomes involved a smaller reward delivered immediately, or a larger reward delivered after a period of delay. Friedel et al. conducted a study to examine the delay discounting and impulsive behaviour of 38 participants who smoked cigarettes, and 32 participants who did not smoke. They noted that inclusion criteria involved participants who were adults aged 21 and older. Friedel et al. explained that hypothetical monetary rewards were displayed on a computer touchscreen. They noted that the participants were to select between a smaller sooner reward and a larger later reward by touching the option on the screen to indicate their response. Friedel et al. found that when presented with a variety of delay discounting tasks including outcomes related to hypothetical monetary rewards, and health advantages, smokers engaged in higher rates of discounting when compared to non-smokers.

Critchfield and Kollins (2001) conducted a review of previous research regarding delay discounting. They explained that the common methodology amongst recent studies involves hypothetical questions regarding monetary outcomes and noted that a researcher will provide the participant with instructions and then administer the questions via computer or index cards. Critchfield and Kollins also supported the use of hypothetical outcomes. They explained that most adults have prior learning experience with monetary consequences. Critchfield and Kollins also noted that when comparing studies, those that used real monetary rewards had similar results to those that used hypothetical monetary rewards. Critchfield and Kollins noted that assessing the delay discounting rates between various populations has been effective. They explained that studies have been conducted demonstrating evidence of the difference in discounting patterns of individuals with a history of substance abuse when compared to individuals with no history of substance abuse. They concluded that delay discounting measures can also be useful in examining impulsive behaviours associated with ADHD. They explained that individuals with ADHD are likely to have a higher k value, or engage in high rates of delay discounting, in comparison to control groups. They explained that these findings can be useful in guiding behavioural interventions for individuals with ADHD.

Critchfield and Kollins noted that in a clinical setting, measures of delay discounting may be a valid means to assess aberrant, impulsive behaviours amongst various populations. Critchfield and Kollins noted that substance abuse may be related to delay discounting. They explained that individuals are likely to engage in substance use behaviour to elicit the immediate effects of the substance, while discounting the delayed rewards, such as health benefits, that abstaining from substances may enable.

A review by Bulley, Henry, and Suddendorf (2016) also noted that a valid measure of delay discounting involves hypothetical monetary discounting tasks. They explained that these measures are used to examine abilities of delaying gratification. Bulley et al. noted that individuals are likely to select the more immediate outcome, regardless of if it is smaller than a larger delayed outcome. They also noted that delay discounting measurement procedures have been conducted in experiments with children involving participant selection of a small, immediate edible consequence or a delayed, lager edible consequence. Bulley et al. explained
that similar experiments had also been conducted with animals and involved the use of edible rewards. Bulley et al. concluded that both animals and humans are likely to select smaller sooner rewards versus larger later rewards.

Previous studies have demonstrated the use of computer-based and paper-based delay discounting questionnaires. These questionnaires have been used to examine the delay discounting patterns of various populations including children, adolescents, and adults, as well as children with ASD and ADHD, and individuals with a history of substance abuse as well as previous suicide attempts. A monetary questionnaire is likely to be an effective measure for use in evaluating the rates of delay discounting of forensic inpatients with complex mental illness.

**Examining Inpatient Psychopathy**

Tendencies to exhibit psychopathic characteristics may be related to impulsive behaviour, or high-rates of delay discounting. According to Vassileva, Georgiev, Martin, Gonzalez, and Segala (2011), some characteristics of psychopathy may include a lack of impulse control. They also explained that based on previous studies (Vassileva et al. 2007 as cited in Vassileva et al. 2011), participants with heroin use disorders and psychopathic traits were likely to engage in impulsive behaviours. Vassileva et al. (2011) conducted a study with 92 male participants who were between the ages of 18 and 50. They recruited participants who had substance dependence and were undergoing treatment at outpatient clinics. Vassileva et al. noted that the purpose of the research was to examine the relationship between impulsivity such as delay discounting, and psychopathy among heroin users. Vassileva et al. administered the Monetary Choice Questionnaire (MCQ) by Kirby, Petry, and Bickel (1999) to assess participant selection of smaller sooner or larger later rewards. Based on participant scores on the Psychopathy Checklist-Revised ([PCL-R]; Hare, as cited in Vassileva et al., 2011), the authors divided the participants into two subgroups which they labelled as psychopathic, and non-psychopathic. The authors used 25 as a standard cut-off score on the PCL-R to create these groups; participants scoring below 25 were placed in the non-psychopathic group (n=72), while those with scores above 25 were placed in the psychopathic group (n=20). Vassileva et al. conducted an ANOVA to examine participant k scores based on the small, medium, and large magnitude categories of the MCQ, for the non-psychopathic group, and the psychopathic group. They did not find a significant main effect, nor a significant interaction effect. Vassileva et al. explained that the results did not display evidence to support the hypothesis that those with psychopathy were likely to display deficits in impulse control, or steep rates of delay discounting. They concluded that psychopathy among individuals with heroin use disorders may contribute to deficits in decision making, however it may not influence impulsive behaviour such as delay discounting. Some limitations that were not addressed in the study by Vassileva et al. may include the criteria for the intended population for administration of the PCL-R. The intended population for use of the PCL-R include institution inmates, and forensic inpatients. As Vassileva et al. recruited participants from outpatient treatment facilities, the evaluation of psychopathy may not be as relevant to these participants as those in a forensic inpatient setting.

**Assessing Risk of Aggressive Behaviour**

According to Ogloff and Daffern (2006), aggression is a frequent concern within the psychiatric treatment setting. A study by Ogloff and Daffern took place in a secure, forensic unit involving 100 participants. They noted that the participants consisted of both male and female
inpatients who were NCRMD, and who were receiving treatment and rehabilitation services for complex mental illness. Ogloff and Daffern explained that among diagnoses, most participants were diagnosed with schizophrenia, while others were diagnosed with mood disorders, personality disorders, developmental disabilities, and substance abuse disorders.

Ogloff and Daffern used an adapted version of the Overt Aggression Scale (OAS) by Yudofsky to operationalize aggressive behaviour into 3 categories. They further elaborated that the 3 categories included, physical aggression towards property, verbal aggression towards others, and aggression towards self or others (Yudofsky as cited in Ogloff and Daffern). Ogloff and Daffern modified the scale so that it did not encompass self-harm as a measure of aggression for the purposes of this study. They explained that nursing staff were to use the adapted scale to record incidents of aggression if an incident occurred, or at the end of each nursing shift. They noted that nursing staff were also trained in other various methods of risk assessment including Broset Violence Checklist (BVC) and the Historical Clinical Risk Management-20 (HCR-20). Nursing staff learned to rate the 3 categories of aggression based on the BVC and HCR-20 reports. Ogloff and Daffern explained that their Dynamic Appraisal of Situational Aggression (DASA) was generated from the results of the statistical analyses of the study. The results revealed the questions with the most predictive validity. They noted that the DASA contains a combination of the questions that have a strong correlation with violence.

Ogloff and Daffern explained that violence on the DASA is rated as a score of 0 as low-risk, 1-3 as moderate-risk, and that scores of 4 or higher demonstrate a high risk of violence. According to Ogloff and Daffern, the likelihood of aggression can be positively correlated with patient scores on the DASA. They noted that the DASA is a useful measure in consistently assessing for risk of aggression and managing the risks on a forensic unit. Ogloff and Daffern discussed the advantages of the DASA and noted that it requires minimal time to complete, is valid in predicting aggression, and aids in risk management and treatment planning. Ogloff and Daffern supported the efficacy of use of the DASA with forensic inpatients. Through the results of the study, they concluded that the DASA is an efficient, structured tool that requires least restrictive means of assessing risk of aggressive behaviour. They noted the efficacy of recording on the DASA, as it is completed by nursing staff, as used as a structured tool, versus use of clinical judgement. Ogloff and Daffern also explained that although the DASA is designed for use in psychiatric inpatient settings, and noted that there may be implications for further study of it in a range of settings to evaluate violence-risk with other populations.

Griffith, Daffern, and Godber (2013) noted that the Dynamic Appraisal of Situational Aggression – Inpatient Version (DASA-IV) is comprised of questions to predict risk of aggression, as well as a rating of low, moderate, or high risk, and a report of the categories of aggressive behaviour such as aggression towards property or physical aggression towards others as well as verbal aggression towards others. Griffith et al. conducted a study to examine the predictive value in assessing for risk with the use of the DASA-IV in comparison to unstructured clinical judgement. Griffith et al. conducted a study with 18 participants who were part of a nursing staff on a secure, non-forensic psychiatric unit. They randomly assigned participants to a control group or to an experimental group. They noted that the experimental group was trained in the use of the DASA-IV, while the control group was not.

Griffith et al. found that when administered once, after an 8-hour nursing shift, the DASA-IV is useful in predicting risk of violence over the next 24-hour period in comparison to unstructured clinical judgement. They explained that more accurate predictions of aggression provide nursing staff with an opportunity to mitigate violent situations. Griffith et al. concluded
that the DASA-IV is a valid measure in assessing risk within mental health treatment settings and suggested implications for future research to be conducted regarding the use of the DASA-IV in non-forensic settings.

Doyle and Logan (2012) conducted a review of previous research pertaining to various risk assessment resources. They noted that the DASA was developed for use in psychiatric settings, and that it is a valid measure in predicting risk of violence of a medium-term period of time. Doyle and Logan found a limitation regarding risk assessment resources such as the DASA and explained that although relevant at predicting aggressive behaviour, it may be more beneficial to advocate for means of assessment that prevent aggressive behaviour.

Barry-Walsh, Daffern, Duncan, and Ogloff (2009) conducted research to examine the predictive validity of the DASA in assessing for risk of aggression. Barry-Walsh et al. implemented the study in a secure, forensic, rehabilitation unit. They recruited 58 participants who were patients with diagnoses of various mental disorders including, schizophrenia, bipolar disorder, schizoaffective disorder, as well as some diagnoses of intellectual disabilities.

According to Barry-Walsh et al., nursing staff learned how to administer the DASA and scored the clients once each day over a period of 18 months. They explained that the nurses also recorded the form of occurrences of aggressive behaviour including whether aggression was direction towards staff, other co-patients, or towards property. Barry-Walsh et al. found that during the 18-month period, over 250 incidents of aggression were recorded. They noted that all incidents of aggression were labelled in the 3 categories of aggression, with incidents of verbal aggression occurring the most frequently with over 100 recorded incidents. They noted that physical aggression towards staff, co-patients, and property were recorded respectively, with over 30 incidents per category. Barry-Walsh concluded that patient verbal aggression was often direct towards staff, while more severe aggression may be direct towards co-patients. Barry-Walsh et al. noted that the DASA is a valid risk assessment resource in predicting aggressive behaviour. Like Griffith et al., Barry-Walsh et al. also suggested that the DASA could be used in settings other than inpatient units, such as in outpatient services.

**Summary**

In conclusion, the DASA was derived from various existing risk assessment scales and demonstrated to be a valid measure for use with forensic inpatients in recording incidents of aggression and assessing for risk over a 24-hour period. Previous studies have shown that the DASA-IV is effective at predicting risk in a forensic mental health setting, among clients with a variety of mental health diagnoses, including those who exhibit psychopathic characteristics. This is because the DASA-IV provides a score where a client is rated as a *low-risk, moderate-risk*, or *high-risk*, for engaging in aggressive behaviour over the following 24 hours. Another feature of the DASA-IV is the report of incidents of aggression based on the operationalized categories of verbal aggression towards others, physical aggression towards others, and physical aggression towards property. This component of the DASA-IV allows for collection of data in relation to the nature of the aggressive incidents.

When used in a forensic inpatient setting, staff administer the DASA-IV once per day to record presence of absence of aggressive behaviour. Data collected from the DASA involves the presence or absence of aggressive behaviour, and the form of aggression. Data from the DASA-IV can be statistically analyzed to evaluate for a correlation with scores on a delay discounting questionnaire. It is hypothesized that this thesis will show: that data from the DASA-IV involving verbal intimidation or threats may be correlated with *low-rates* of delay discounting, while reports of physical aggression towards property may reflect *moderate-rates* of discounting,
and records physical aggression towards others may be correlated with *high-rates* of delay discounting.
Chapter III: Method

Participants

The current study involved 16 participants who were inpatients in a forensic mental health setting. All participants were receiving rehabilitation services and treatment for complex mental illness. This study involved 15 male participants and 1 female participant. There were 10 participants who resided in a minimum secure unit, and 6 who were inpatients in a secure unit. Inclusion criteria involved participants with a diagnosis of one or more major mental illnesses, between the ages of 18-90 years, and receipt of treatment services within the forensic program for a minimum of 1 month. Selection procedures excluded participants who could not provide written consent.

This research study was approved (Appendix A) by the Centre for Addiction and Mental Health Research Ethics Board (CAMH REB).

Design

This non-experimental research study examined the variables of aggressive behaviour and delay discounting.

Variables. This study analyzed the variable of participant scores on the monetary choice questionnaire by collecting data during the interview process. This study also analyzed the variable of aggressive behaviour. Data regarding aggression were collected indirectly by nursing staff who recorded frequency data once per 24-hour period, during the night shift. These data reflected three forms of aggression, listed below, as well as absence of aggression.

Monetary choice questionnaire scores. The scores on the monetary choice questionnaire (MCQ) involve participant selection of a small, immediate reward or a large, delayed reward. When coded and statistically analyzed, these scores reflect an overall \( k \) value, as well as delay discounting rates on magnitude of the hypothetical reward as through categories. These categories based on the fixed questions regarding the reward sizes of small, medium, and large \( k \) values (Kirby, Petry, and Bickel, 1999).

Form of aggression. Nursing staff recorded aggressive behaviour once every 24-hour period, during the night shift, on the Dynamic Appraisal of Situational Aggression – Inpatient Version (DASA – IV; [Ogloff and Daffern, 2006]). Nursing staff recorded aggressive behaviour as either ‘present’ or ‘absent’ while assessing an inpatient. The three types of aggression are detailed below.

Physical aggression towards others (DASAPAO). Yudofsky et al. as cited in Ogloff and Daffern (2006) defined this as “Any incident of a successful and/or unsuccessful use of physical force to harm or abuse another person e.g., hitting, striking, punching, throwing objects, spitting, pinching, scratching, head-butting, pushing, hair pulling and kicking of other people” (p. 804).

Physical aggression towards property or furniture (DASAPAE). Yudofsky et al. as cited in Ogloff and Daffern (2006) described this as “Any incident of a successful and/or unsuccessful attempt to forcefully misuse, damage, or destroy items or objects e.g., slamming of doors, throwing objects, kicking furniture, smashing windows, and/or setting fires” (p. 804).
Verbal intimidation or threats of harm toward other (DASAVI). Yudofsky et al. as cited in Ogloff and Daffern (2006) defined this as “Any incident of interacting with another person by shouting angrily, insulting or cursing, using derogatory language in anger, verbal or nonverbal intimidation, or making threats of harm towards other people” (p. 804).

Non-engagement in aggression. This includes recorded absences of all forms of aggressive behaviour.

Data analysis. Data collected from participant selection of outcomes on the Monetary Choice Questionnaire (MCQ) were coded as a ‘0’ for participant selection of small, immediate outcomes, or a ‘1’ for participant selection of large, delayed outcomes. These data were inputted into a 27-item Monetary Choice Questionnaire Automated Scorer (Kaplan, Lemley, Reed, and Jarmolowicz, 2014). Data from the MCQ were entered into the automated scorer to obtain the k value of participant MCQ scores. The automated scorer analyzes the ‘1’ or ‘0’ in accordance with each of the 27 questions. Each question reflects a small, medium, or large k value (Kirby, Petry, and Bickel, 1999) and the automated scorer calculates the data to produce three categories small, medium, and large scores for the k value, as well as an overall k score. These data are presented in graphical displays of the rate of delay discounting, or the k value of participant scores. Frequency data of each form of aggressive behaviour are also presented in graphical figures. To evaluate the relationship between the two variables, a Pearson product-moment correlation coefficient test was conducted in Microsoft Excel software as well as GraphPad Prism software. Tables display the results of the descriptive statistics, such as the mean, median, and standard deviation of the k scores. Tables also display the results of the correlation analyses.

Setting
The study was conducted within the agency at Centre for Addiction and Mental Health (CAMH). The researcher moved to various units to recruit participants and conducted interviews on each participant’s unit. The investigator utilized available spaces, such as an interview room, or a conference room, for interviewing the participant. The rooms contained two chairs and a desk or table. Separately, the researcher scored questionnaires and conducted client chart reviews in an office equipped with an on-site computer, to access the agency database. Other required materials for the interview process included two pens, a blank sheet of paper, a blank interview package, and $10.00 cash, as monetary compensation for each participant.

Measures
Client chart review. A chart review (Appendix B) was conducted for the larger research project through reviewing the variables to be measured. For the current study, a subset of the larger scale study, data were collected from the chart review portion regarding the Dynamic Appraisal of Situational Aggression DASA-IV (Appendix C).

Dynamic Appraisal of Situational Aggression – Inpatient Version (DASA-IV). The original DASA (Ogloff and Daffern, 2006) involved 7 items including easily angered, impulsivity, irritability, negative attitudes, sensitivity to provocation, unwilling to follow directions, and verbal threats. Either a ‘presence’ or ‘absence’ is recorded for each of the 7 items, respectively. Also included is a report of presence or absence of physical aggression towards others (DASAPAO), physical aggression towards property or furniture (DASAPAE), and verbal
intimidation/threats of harm towards others (DASAVT). Staff administered the DASA-IV as part of their existing daily routine. The DASA-IV was completed once every 24 hours by nursing staff who noted whether each of the three forms of aggression was either ‘present’ or ‘absent’ of.

**Monetary Choice Questionnaire (MCQ).** The questionnaire (Appendix D) by authors Kirby, Petry, and Bickel (1999) involves 27 questions with various hypothetical monetary outcomes. These hypothetical outcomes include questions regarding selection between a smaller sooner reward, and a larger later reward. This survey was administered during the interview process. The researcher read the first question aloud to the participant and recorded the participant’s response. The participants were also given the option to record their own responses on the MCQ. Scores from the MCQ display each participant’s $k$ value and degree of delay discounting. To train the thesis author in the administration of the MCQ, the she first observed the senior researcher in administering the MCQ during an interview. Then, the senior researcher observed the thesis author in administering the MCQ, and provided feedback based on performance and interview skills, post-interview. This process was repeated for two consecutive interviews, after which the senior researcher declared that the thesis author was able to administer the MCQ independently.

**Procedures**

**Recruitment.** Researchers contacted forensic unit managers, my e-mail or phone, to obtain permission to recruit participants on various units. Researchers also contacted nursing staff, team leaders and charge nurses, by phone or in person, to set up an appropriate time to recruit participants. Meal times were the general consensus for an appropriate time to deliver a recruitment speech to inpatients. The investigators communicated with nursing staff regarding recruitment procedures at meal times and would wait until the nursing staff noted an appropriate time to deliver the speech. The researchers sought out a bulletin board or space to post a recruitment flyer (Appendix E) with information regarding the study such as, privacy of information, compensation, phone number and contact name to reach researcher, and details to include in a voicemail such as participant name, unit location, and contact number. Nursing staff reviewed the posters to be taped to the bulletin board on each unit.

The recruitment speeches were delivered during lunch times. This process involved the researcher who described key aspects of the study to the inpatients. The investigator explained questions that would be asked during the research interview, that information remains confidential, and mention of the monetary compensation of a $10.00 amount that each participant would receive for their participation in the study. Interested candidates were then invited to sign up immediately with the researcher who would write down first and last name of the participant and create an appointment date and time. The researcher also informed the clients that if they decided at a later time to participate, that the flyer was located on the bulletin board with all of the necessary information to contact the researcher.

**Interview process.** Prior to beginning an interview, the researcher met with the participant’s primary nurse to ensure that there were no scheduled groups, programs, passes, or privileges to be interrupted by the interview. The researcher informed the nurse that the interview would be approximately one hour in length, and asked if the participant was able to provided written consent, and consent to receiving and utilizing money. The investigator sought an available interview room, computer room, or conference room on the client’s unit and met with the client.

**Informed consent.** The researcher provided the participant with a copy of the consent form (Appendix F) and explained the information on the consent form and answered the client’s
questions. If the client agreed to participate, then the client signed two copies of the consent form; one consent form was kept in the client documents package for the study, and the second copy of the consent form was for the client’s records. The thesis author was trained in obtaining informed consent by first observing the senior researcher during an interview. The senior researcher then observed her in obtaining informed consent and provided the thesis author with feedback during the informed consent process. After repeating this procedure for two consecutive interviews, the senior researcher determined that the thesis author was able to independently obtain informed consent from participants.

**Interview documentation.** As the current study was a subset of a larger research project, the interview package involved other documents to be included for the larger scale study. These documents included the Barratt Impulsiveness Scale – 11 (BIS-11; [Patton, Stanford, and Barratt, 1995]), the Brief Psychiatric Rating Scale (BPRS; [Overall, and Gorham, 1962; 1988]), the MCQ (Kirby, Petry, and Bickel, 1999), and the non-standardized probability discounting absconding questionnaire. When administering the BIS-11 the researcher read aloud the instructions and offered to read the self-evaluation to the client and record responses, and also gave the client the option to complete the survey independently. To conduct the BPRS the investigator utilized a blank sheet of paper to record client answers to questions 1-14. The researcher conducted a review of non-verbal behaviour during the interview and other observations to record for questions 15-24. During the MCQ the researcher read aloud the instruction and question number 1. The researcher then offered to read and fill-in the questionnaire with client responses, and also gave the client the option to complete the questionnaire independently. A group of senior researchers at the agency, developed an absconding questionnaire, regarding delay discounting, pertaining to forensic inpatients. Prior to administering the non-standardized, absconding questionnaire, the researcher explained that there would be no adverse implications for the client based on their responses on the questionnaire. This included explaining to the participant that there would not be any adverse effects from the interview related to treatment, nor revocation of passes and privileges, or other punishment procedures to the client as a consequence of answering the hypothetical questions regarding absence without official leave (AWOL). The researcher would then read each question to the client and record client responses. After the interview the researcher conducted a chart review of client data including demographic variables. Included in the chart review was collection of client scores on the Psychopathy Checklist Revised [PCL-R; Hare, (n.d)]. PCL-R scores were a variable that was collected for the larger study and also analyzed for the current research project. PCL-R scores were collected through assessment upon client admission to the agency, this excludes female inpatients and may not be conducted with some male clients for a variety of other reasons. The chart review also involved collecting DASA-IV reports. During the night shift, nursing staff analyzed reports collected throughout the prior 24 hours and filled out the DASA-IV in accordance with the reports. This was an indirect measure of behaviour as the researchers collected data as recorded by the nursing staff.

**Monetary compensation.** Following the completion of the interview documents, the researcher obtained the participant’s signature on a subject reimbursement form (Appendix G) to be kept in a locked cabinet. The researcher then gave the participant $10.00 cash and informed the client’s primary nurse that the client had received this cash.
Chapter IV: Results

The aim of this study was to examine the relationship between delay discounting scores and the aggressive behaviours of forensic inpatients. To review, *low-rates* of delay discounting demonstrate the ability to delay gratification, or to wait for a delayed reward, while *high-rates* of delay discounting reflect the need for immediate reinforcement. It was hypothesized that incidents of verbal intimidation were likely to have a relationship with *low-rates* of delay discounting, while occurrences of physical aggression towards property was more likely to have a relation to *moderate-rates* of delay discounting, and incidents of physical aggression towards others was likely to correlate with *high-rates* of delay discounting.

There were 16 participants in the current study, and of these 94% or 15 were male. Among the participants, six were inpatients on a medium secure unit, while 10 resided on minimum secure units.

The number of diagnoses per client ranged from a minimum of one diagnosis, to a maximum of 4 diagnoses (Table 1). The group average number of diagnoses was \( M = 2.63 \). Schizophrenia accounted for 75% of diagnoses among the group, and 94% of the group was diagnosed with a comorbid substance use disorder. Other diagnoses included personality disorders, mood disorders, and diagnosis of an intellectual disability.

*Table 1. Descriptive Statistics*

<table>
<thead>
<tr>
<th></th>
<th>( N )</th>
<th>Mean</th>
<th>Median</th>
<th>Std. Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>16</td>
<td>39.5</td>
<td>36</td>
<td>12.85</td>
<td>21- 62</td>
</tr>
<tr>
<td>Total diagnoses</td>
<td>42</td>
<td>2.63</td>
<td>2.5</td>
<td>0.86</td>
<td>1- 4</td>
</tr>
<tr>
<td>Total psyc. meds.</td>
<td>23</td>
<td>1.44</td>
<td>1</td>
<td>0.61</td>
<td>1- 3</td>
</tr>
<tr>
<td>Overall ( k ) score</td>
<td>16</td>
<td>0.07</td>
<td>0.02</td>
<td>0.09</td>
<td>0.00- 0.25</td>
</tr>
</tbody>
</table>

*Note.* Total psyc. meds. = Total number of prescribed psychotropic medications; Overall \( k \) score = MCQ questionnaire.

The author placed the distribution of participant \( k \) scores into 3 groups. These groups categorized \( k \) scores of 0.00- 0.10 as reflecting *low-rates* of delay discounting, 0.15-0.20 as indicative of *moderate-rates* of delay discounting, and \( k \) scores of 0.25 to be *high-rates* of delay
Delay discounting and aggression. Cut-off scores for these groups were created from the distribution of data in the present sample. Frequency data from the MCQ of the overall \( k \) scores displayed in Figure 1, show that 12 participants in the group engaged in low-rates of delay discounting, 2 showed moderate rates and 2 showed high rates, using the afore-mentioned \( k \) score ranges.

![Overall k Score Frequency Distribution](image)

**Figure 1.** Overall \( k \) score frequency distribution chart.

In total, data from the DASA-IV were recorded over a 6-month period and collected for the majority of participants \( (n=14) \). There were two participants who had not been admitted to the agency long enough to obtain 6 months of DASA-IV data, but contributed data for measures of shorter periods of time. If applicable, DASA-IV data were analyzed for each participant for the day of the interview, the day after, the past 7 days, past 30 days, past 60, past 90 days, as well as a 14-day follow-up period (Table 2). There was 6% of data missing in the past 30 days, 13% of missing data in the past 60 days, and 13% missing data in the past 90 days of each form of aggression recorded.

<table>
<thead>
<tr>
<th><strong>Table 2. Glossary</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Term</strong></td>
</tr>
<tr>
<td>Day of</td>
</tr>
<tr>
<td>Day after</td>
</tr>
</tbody>
</table>
Past 7 | Recorded DASA-IV data in the 6 days prior to, and including the day of the research interview.
---|---
Past 30 | Recorded DASA-IV data in the 29 days prior to, and including the day of the research interview.
Past 60 | Recorded DASA-IV data in the 59 days prior to, and including the day of the research interview.
Past 90 | Recorded DASA-IV data in the 89 days prior to, and including the day of the research interview.
14-Day Follow-up | DASA-IV data recorded over the 14 days post-research interview for each respective participant.
Rate of aggression | The total number of days with aggressive incidents, including any occurrence of the 3 types of aggression, divided by the total number of days with DASA-IV data recorded. This excludes days with missing data.

Participants were divided into groups based on engagement in no aggression, verbal intimidation or threats (VI), physical aggression towards property or furniture (PAE), and physical aggression towards others (PAO). DASA-IV data revealed that groups of individuals were heterogeneous, as some individuals exhibited more than one form of aggressive behaviour, while 35% of the group did not engage in any aggressive incidents (Figure 2).

![Figure 2. Percentage of participant engagement in forms of aggression and no aggression.](image-url)
The data displayed in Figure 3 shows that the average overall $k$ score of participants who did not engage in any form of aggression was 0.11 ($SD=0.09$), while those who engaged in verbal intimidation or threats had an average overall $k$ score of 0.06 ($SD=0.09$). Subjects who exhibited physical aggression towards property had an average overall $k$ score of 0.05 ($SD=0.05$), and those who engaged in physical aggression towards others had an average overall $k$ score of 0.06 ($SD=0.10$).

**Figure 3.** Average of overall $k$ scores and forms of aggression.

DASA-IV data were recorded over a 6-month period for 87.5% of the participants ($n=14$), as 12.5% ($n=2$) of participants had not been admitted to the hospital long enough to collect 6 months of DASA-IV data. For some variables, there were data for all 16 participants. Participant rates of aggression were calculated based on the total number of aggressive incidents, regardless of length of stay ($N=16$, $M=0.02$, $SD=0.04$), including any occurrence of each of the three forms of aggressive behaviour for each participant, this total sum was then divided by the total number of days where DASA-IV data were collected. This excluded days were the DASA-IV was not recorded. A Pearson correlation analysis was conducted through Microsoft Excel software and GraphPad Prism software to examine the relationship between participant rates of aggression and their overall $k$ scores, and generate all the statistics as follow. The analysis, as shown in Table 3, indicated that there was no statistically significant relationship between rates of aggression and the overall $k$ scores $r=0.28$, $N=16$ $p=0.29$ (Table 3).

Figure 4 displays participant rates of aggression and the overall $k$ scores for each participant ($N=16$, $M=0.07$, $SD=0.09$). A trend line was included in Figure 4 using the Excel
Trend line function. Visual analysis of the trend line suggests a slightly increasing trend, in that as $k$ scores increase, the rate of aggression also increases.

**Table 3. Correlation Statistics Between Rate of Aggression and Overall $k$**

<table>
<thead>
<tr>
<th>Rate of Aggression &amp; Overall $k$</th>
<th>$N$</th>
<th>$p$</th>
<th>$r$</th>
<th>$r^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16</td>
<td>0.29</td>
<td>0.28</td>
<td>0.08</td>
</tr>
</tbody>
</table>

*Note.* *Significant at the $p \leq 0.05$ level, **Significant at the $p \leq 0.01$ level. Overall $k =$ MCQ questionnaire, Rate of Aggression = total number of days with aggression divided by total days with DASA-IV recorded.

**Figure 4.** Participant rates of total aggressive incidents and overall $k$ scores.

There were no occurrences of any forms of aggression on the day of the interview ($N=16$, $M=0$, $SD=0$). There was one recorded occurrence of physical aggression towards others on the day after the interview ($N=16$, $M=0.06$, $SD=0.24$). Pearson correlation coefficient analyses were conducted to examine the relationship between the overall $k$ score and each form of aggression (Tables 4, 5, and 6).

As there were no occurrences of verbal intimidation or threats during the 14-day follow-up period ($N=16$, $M=0$, $SD=0$) no correlations are listed below in Table 4. There was no
statistically significant relationship between the number of occurrences of VI in the past 7 days and the overall $k$ score ($r=-0.13$, $N=16$, $p=0.63$). Nor was there a statistically significant relationship between VI in the past 30 days and the overall $k$ score ($r=-0.25$, $n=15$, $p=0.36$), the past 60 days and the overall $k$ ($r=0.01$, $n=14$, $p=0.97$), or the past 90 days and the overall $k$ ($r=-0.11$, $n=14$, $p=0.70$).

Table 4. Correlations Between VI and Overall $k$

<table>
<thead>
<tr>
<th></th>
<th>$N$</th>
<th>$p$</th>
<th>$r$</th>
<th>$r^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall $k$ &amp; VI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past 7 Days</td>
<td>16</td>
<td>0.63</td>
<td>-0.13</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall $k$ &amp; VI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past 30 Days</td>
<td>15</td>
<td>0.36</td>
<td>-0.25</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall $k$ &amp; VI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past 60 Days</td>
<td>14</td>
<td>0.97</td>
<td>0.01</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall $k$ &amp; VI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past 90 Days</td>
<td>14</td>
<td>0.70</td>
<td>-0.11</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Note. *Significant at the $p \leq 0.05$ level, **Significant at the $p \leq 0.01$ level. Overall $k$ = MCQ questionnaire, VI = verbal intimidation or threats.

There were no occurrences of physical aggression towards property or furniture within the 7 days prior to the interview ($N=16$, $M=0$, $SD=0$). Table 5 demonstrates that there was no statistically significant relationship between the number of occurrences of PAE and the overall $k$ score for the past 30 days ($r=-0.20$, $N=15$, $p=0.47$), the past 60 days ($r=-0.20$, $n=14$, $p=0.50$), or the past 90 days ($r=-0.29$, $n=14$, $p=0.32$). The overall $k$ score did not have a statistically significant relationship with PAE during the 14-day follow-up period ($r=-0.19$, $N=16$, $p=0.49$).
Table 5. Correlation Statistics Between PAE and Overall k

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>p</th>
<th>r</th>
<th>r^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall k &amp; PAE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past 30 Days</td>
<td>15</td>
<td>0.47</td>
<td>-0.20</td>
<td>0.04</td>
</tr>
<tr>
<td>Past 60 Days</td>
<td>14</td>
<td>0.50</td>
<td>-0.20</td>
<td>0.04</td>
</tr>
<tr>
<td>Past 90 Days</td>
<td>14</td>
<td>0.32</td>
<td>-0.29</td>
<td>0.08</td>
</tr>
<tr>
<td>14-Day Follow-up</td>
<td>16</td>
<td>0.49</td>
<td>-0.19</td>
<td>0.04</td>
</tr>
</tbody>
</table>

*Note.* *Significant at the* p*≤ 0.05 level, **Significant at the* p*≤ 0.01 level. Overall k = MCQ questionnaire, PAE = physical aggression towards property or furniture.

There were no occurrences of physical aggression towards others within the 7 days prior to the interview (N= 16, M=0, SD=0). As shown in Table 6, there was no statistically significant relationship between the overall k score and the number of occurrences of PAO during the past 30 days (r= -0.20, n=15, p=0.47), the past 60 days (r= 0.18, n=14, p=0.55), or the past 90 days (r= -0.09, n= 14, p= 0.75). The results did not show a statistically significant relationship between the overall k and PAO during the 14-day follow-up period (r= -0.20, N=16, p=0.46).

As displayed in tables 4, 5, and 6, there were no statistically significant correlations between participant overall k scores, and the 3 forms of aggression.
### Table 6. Correlation Statistics Between PAO and Overall k

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>p</th>
<th>r</th>
<th>r²</th>
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<tbody>
<tr>
<td>Overall k &amp; PAO Past 30 Days</td>
<td>15</td>
<td>0.47</td>
<td>-0.20</td>
<td>0.04</td>
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<tr>
<td>Overall k &amp; PAO Past 60 Days</td>
<td>14</td>
<td>0.55</td>
<td>0.18</td>
<td>0.03</td>
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<tr>
<td>Overall k &amp; PAO Past 90 Days</td>
<td>14</td>
<td>0.75</td>
<td>-0.09</td>
<td>0.01</td>
</tr>
<tr>
<td>Overall k &amp; PAO 14-Day Follow-up</td>
<td>16</td>
<td>0.46</td>
<td>-0.20</td>
<td>0.04</td>
</tr>
</tbody>
</table>

*Note. *Significant at the $p \leq 0.05$ level, **Significant at the $p \leq 0.01$ level. Overall k = MCQ questionnaire, PAO = physical aggression towards others.*
Secondary findings shown in Table 7 revealed some statistically significant relationships between participant Psychopathy Checklist Revised [PCL-R; Hare, (n.d)] scores, and some forms of aggression. Pearson correlation analyses were conducted to examine the relationship between PCL-R scores and the 3 forms of aggressive behaviour. This included examining the PCL-R scores in relation to 3 forms of aggression the day of, day after, the past 7 days, past 30, past 60, past 90, and during the 14-day follow-up period. Among these variables, statistical analyses revealed 4 statistically significant relationships.

There were no occurrences of VI on the day of the interview, the day after, or during the 14-day follow-up period. There was no statistically significant correlation between PCL-R scores and VI during the past 7 days ($r=0.07$, $n=12$, $p=0.84$) or the past 30 days ($r=0.50$, $n=12$, $p=0.10$). The analyses revealed that the PCL-R scores had a statistically significant relationship with VI in the past 60 days ($r=0.66$, $n=12$, $p=0.02$), and the past 90 days ($r=0.65$, $n=12$, $p=0.02$).

There were no incidents of PAE on the day of, the day after, or the past 7. PCL-R scores did not have a statistically significant relationship with PAE in the past 30 days ($r=-0.47$, $n=12$, $p=0.12$), the past 60 days ($r=-0.47$, $n=12$, $p=0.12$), the past 90 days ($r=0.10$, $n=12$, $p=0.76$), or the 14-day follow-up period ($r=-0.47$, $n=12$, $p=0.12$).

There were no incidents of PAO on the day of the interview, or during the past 7 days. PCL-R scores did not have a statistically significant relationship with PAO on the day after the interview ($r=-0.47$, $n=12$, $p=0.12$), the past 60 days ($r=0.01$, $n=12$, $p=0.75$), or during the 14-day follow-up period ($r=-0.47$, $n=12$, $p=0.12$). The results also displayed that PCL-R scores were significantly correlated with PAO in the past 30 days ($r=0.61$, $n=12$, $p=0.04$), as well as with PAO in the past 90 days ($r=0.63$, $n=12$, $p=0.03$).
<table>
<thead>
<tr>
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<th>N</th>
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<th>r</th>
<th>$r^2$</th>
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<tr>
<td>PCL-R &amp; VI</td>
<td>12</td>
<td>0.84</td>
<td>0.07</td>
<td>0.00</td>
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<tr>
<td>Past 7 Days</td>
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<tr>
<td>PCL-R &amp; VI</td>
<td>12</td>
<td>0.10</td>
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<td>0.25</td>
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<td>Past 30 Days</td>
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</tr>
<tr>
<td>PCL-R &amp; VI</td>
<td>12</td>
<td>0.02*</td>
<td>0.66</td>
<td>0.44</td>
</tr>
<tr>
<td>Past 60 Days</td>
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<tr>
<td>PCL-R &amp; VI</td>
<td>12</td>
<td>0.02*</td>
<td>0.65</td>
<td>0.42</td>
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<tr>
<td>Past 90 Days</td>
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<tr>
<td>PCL-R &amp; PAE</td>
<td>12</td>
<td>0.12</td>
<td>-0.47</td>
<td>0.22</td>
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<tr>
<td>Past 30</td>
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<tr>
<td>PCL-R &amp; PAE</td>
<td>12</td>
<td>0.12</td>
<td>-0.47</td>
<td>0.22</td>
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<tr>
<td>Past 60</td>
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<td>PCL-R &amp; PAE</td>
<td>12</td>
<td>0.76</td>
<td>0.10</td>
<td>0.01</td>
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<tr>
<td>Past 90</td>
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<td></td>
</tr>
<tr>
<td>PCL-R &amp; PAE</td>
<td>12</td>
<td>0.12</td>
<td>-0.47</td>
<td>0.22</td>
</tr>
<tr>
<td>14-Day Follow-up</td>
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<td></td>
</tr>
<tr>
<td>PCL-R &amp; PAO</td>
<td>12</td>
<td>0.12</td>
<td>-0.47</td>
<td>0.22</td>
</tr>
<tr>
<td>Day After</td>
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<tr>
<td>PCL-R &amp; PAO</td>
<td>12</td>
<td>0.04*</td>
<td>0.61</td>
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</tr>
<tr>
<td>PCL-R &amp; PAO</td>
<td>12</td>
<td>0.75</td>
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<td>0.01</td>
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<tr>
<td>Past 60 Days</td>
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<tr>
<td>PCL-R &amp; PAO</td>
<td>12</td>
<td>0.03*</td>
<td>0.63</td>
<td>0.40</td>
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<td>Past 90 Days</td>
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<tr>
<td>PCL-R &amp; PAO</td>
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<tr>
<td>14-Day Follow-up</td>
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<td></td>
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</tr>
</tbody>
</table>
Note. *Significant at the $p \leq 0.05$ level, **Significant at the $p \leq 0.01$ level. PCL-R = Psychopathy Checklist Revised, VI= verbal intimidation or threats, PAE= physical aggression towards property or furniture, PAO= physical aggression towards others.

Table 8 displays the results of Pearson correlation analyses between PCL-R scores and the overall $k$ scores. This demonstrates that PCL-R scores did not have a statistically significant relationship with the overall $k$ scores ($r = 0.12, n = 12, p = 0.70$)

<table>
<thead>
<tr>
<th></th>
<th>$N$</th>
<th>$p$</th>
<th>$r$</th>
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<tr>
<td>PCL-R Scores &amp;</td>
<td>12</td>
<td>0.70</td>
<td>0.12</td>
<td>0.01</td>
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<tr>
<td>Overall $k$</td>
<td></td>
<td></td>
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</tbody>
</table>

Note. *Significant at the $p \leq 0.05$ level, **Significant at the $p \leq 0.01$ level. PCL-R = Psychopathy Checklist Revised, Overall $k = $ MCQ questionnaire.
Chapter V: Discussion

Summary

The aim of this pilot study was to examine the relationship between delay discounting and aggressive behaviour. Specifically, how forms of aggression may be linked to the decision-making process involved in weighing small, immediate rewards, and larger, delayed outcomes. The purpose of this study was to answer three questions regarding participant scores on the MCQ, in relation to different forms of aggression. The questions that this study sought to answer are as follows: (1) Are scores reflecting low-rates of delay discounting related to verbal intimidation or threats? (2) Are scores reflecting moderate-rates of delay discounting related to physical aggression towards property? (3) Are scores reflecting high-rates of delay discounting related to physical aggression towards others? The results indicated that there were no statistically significant relationships between participant k scores and aggression in the form of verbal intimidation or threats, physical aggression towards property, or physical aggression towards others. Thus, the hypothesis was not confirmed through the results of this study.

As described earlier, current literature has examined delay discounting behaviours among a variety of populations including a range of ages groups, and diagnoses. In conducting a study to examine the risk-taking behaviour of university students, Shead and Hodgins (2009) found that although participants who selected more immediate outcomes on delay discounting measures were likely to engage in more risk-taking behaviour, these results were not statistically significant. These results may be linked to the population of university students, who may be more likely to delay gratification, in comparison to an individual with complex mental illness.

Although Bridge et al. (2015) did not find a statistically significant relationship between delay discounting and impulsive aggression among adolescents with suicidal ideation, it is possible that these outpatients may have displayed decreased rates of impulsive aggression as a result of undergoing treatment. The participants were receiving behavioural and pharmacological treatment with which impulsive aggression may be incompatible. This may be similar to the current research study, in that forensic inpatients were receiving care from an interdisciplinary team of professionals, as well as receiving pharmacological medications. In particular, the participants in the current study averaged 1.44 psychotropic medications as a group. In total, the participants (N=16) were prescribed a combined amount of 23 psychotropic medications, ranging individually from 1 to 3 medications. These data were recorded through the client chart review. It is likely that through ongoing treatment, some participants may have been inhibited from engaging in aggressive behaviours due to the effect of medication and other treatment.

Also in the current literature, there is research evaluating the delay discounting patterns in children with developmental disabilities. Demurie et al. (2012) found that in comparison to children with ASD, and a control group of typically developing children, those diagnosed with ADHD engaged in higher-rates of delay discounting. This finding is seemingly interesting as ADHD can be characterized by impulsive behaviour traits, which may relate to increased selection of smaller sooner rewards. The importance of the results from Demurie et al. is that not only should age groups be taken into account as a factor, but diagnoses may also have an impact on individual delay discounting patterns. This may also be true for subjects within the rehabilitation system at varying levels of recovery, and with a variety of diagnoses such as schizophrenia, personality disorders, bipolar disorder, and schizoaffective disorder. Different
diagnoses may have influenced the rate at which participants in the current study were able to delay gratification, or select more immediate outcomes.

The study by Green et al. (1999), examined delay discounting patterns among different age groups, including children, young adults, and older adults. They concluded that as rates of delay discounting decreased, age increased. These results demonstrated that older individuals discount at lower-rates than younger individuals. The current study examined the patterns of delay discounting in adults. This may have impacted the distribution of $k$ scores, which were mostly on the low-end of the scale for this particular sample.

Gaps in the current literature include limited research regarding the delay discounting behaviour in relation to aggression; more specifically, the effects of inpatient aggression in the forensic system. The current pilot study was designed to contribute to the literature regarding delay discounting and aggressive behaviour by including adult, forensic, inpatients as a population to be further examined. It was hoped that this study would provide a basis for analyzing a variety of variables regarding this population such as age, diagnosis, length of stay, and psychotropic medications.

Some limitations to this study may include the small sample size of 16 participants. Further research may need to be conducted with a larger sample size of forensic inpatients. Obtaining a larger sample size may have and influence on the distribution of $k$ scores. As demonstrated in Figure 1, the frequency distribution for this sample was negatively skewed, with 75% of participants scoring in the low-rate, $k$ score group. The $k$ scores and PCL-R scores did not have a statistically significant relationship, which may also be a factor of the $k$ scores falling at the low-end.

Although not a large number of findings, the PCL-R scores were correlated with some forms of aggression. The results of the Pearson analysis revealed 4 statistically significant relationships. These correlations were between PCL-R and VI within the past 60 days, PCL-R and VI in the past 90 days, PCL-R and PAO other in the past 30 days, and PCL-R and PAO in the past 90 days. These are the statistically significant findings after correlating the 3 forms of aggression with 7 variables of the DASA-IV data, in order to test a total of 21 relationships. Overall, 4 of these 21 relationships, or 19% were statistically significant. This 19% is more than the 5% expected by chance alone, as a result of repeated correlational testing. Overall, this study found that there were more reliable correlations between aggression and PCL-R scores, than between aggression and $k$ scores.

**Strengths**

This research project was part of a larger study conducted by other professionals within the agency. Some strengths of the current study involved advantages of being part of the larger study. This included having access to standardized interview documentation and assessment resources, readily available funds for participant monetary compensation, and access to agency database for conducting client chart reviews. Other strengths also included contributions made to the larger study, from the placement student. This included recruiting subjects to participate, and collecting and inputting data for the larger study. This may have had benefits for the agency by protecting the time of the professionals involved in the study. Additional strengths of the current study included the placement student’s access to support, supervision, and feedback from primary researchers. As this study built on previously conducted methodologies for recruiting, and interviewing subjects, and established protocols for entering data, there was an efficient
process in place for these areas. This allowed for the primary researchers to provide the placement student with guidance and autonomy when implementing the different aspects of the research process. Some strengths of the findings include the statistically significant correlations between PCL-R scores and some aspects of aggression. These findings may impact the agency by increasing awareness of the relationship between PCL-R scores and some forms of aggression; however, further research would need to be conducted regarding these two variables, to provide the agency with additional information and potential areas of treatment and risk management.

**Limitations**

As previously stated, other research studies have been conducted to evaluate delay discounting in various populations. A number of limitations were identified within the current study, which may have contributed to failure to reject the null hypothesis with respect to the above mentioned three initial hypotheses of the study. As noted before, the small sample size ($N=16$) may have been a limitation to obtaining a more normal distribution of $k$ scores. Kirby, Petry, and Bickel (1999) conducted their study with 56 outpatients, diagnosed with substance use disorders, and 60 control subjects. Kirby et al. found that while both groups had relatively normal distributions, the outpatient group had an increased frequency of high $k$ scores. This current study only included inpatients who may have had an impact on the distribution of $k$ scores, as 75% were at low $K$ values, in comparison to Kirby et al. study that used outpatients.

Individuals who have substance use disorders may be more likely to engage in more impulsive behaviours, or high-rates of delay discounting. Moody, Franck, Hatz, and Bickel (2016) conducted a study with 599 participants, of which 68% were male. Moody et al. compared the monetary delay discounting patterns of separate groups of participants who used one substance, used two, or three substances, as well as a control group who did not use any substances. They found that the substance use groups, who reported use of cigarettes, cocaine, or alcohol, engaged in higher rates of discounting than the control group. Moody et al. also noted that participants who smoked cigarettes and used cocaine or alcohol discounted at higher rates than subjects who used only cigarettes. They also noted that participants who used cigarettes, cocaine, and alcohol discounted at higher rates in comparison to those who smoked cigarettes only. Although 94% of participants in the current study were diagnosed with a comorbid substance use disorder, the small sample size, and the controlled environment of the forensic system may have limited the observation of higher $k$ scores that may be expected from individuals with substance use disorders, based on previous research.

Also mentioned above is that 75% of participants scores at the low-end of $k$, this may have been a limitation in examining the distribution. Other limits of this study include the sex of the participants may have also been a limitation of the study as there were bias towards to male participants ($n=15$), versus female participants ($n=1$). Further research should be conducted to examine any potential impact of differences in gender, on the selection of smaller, sooner rewards, or larger, later outcomes.

There were some barriers to obtaining a large sample size for this study. Some of these difficulties included the nature of the ongoing, earlier study, combined with the forensic setting, as some of the clients progress more slowly through the system, and remain with the agency for a minimum of one year. Through continuation of this research study, some inpatients who were willing to participate in the current study were not eligible to participate, as they had already
been involved in the study when it had initially been implemented. Duplicate data were not collected, and these participants were informed that they had already participated in the study. Participant length of stay may have had an influence on the \( k \) scores, as \( k \) scores reflect decision making based on the monetary questionnaire. Some participants may have a substitute decision maker to manage their funds, or may be institutionalized in that they have less need for money immediately. The larger study included participant length of stay as a variable to consider, however, a limitation of the current research study was that length of stay was not examined.

Some ethical concerns involved difficulty with identifying inpatients who were unable to participate in the study as a result of their current level of cognitive abilities, which impact the ability to provide informed consent. Some interviews were not completed as the researcher found some clients to be unable to provide informed consent. While other interviews were conducted and some data were thrown out based on the notion that these individuals lacked the cognitive capacity to understand and participate in the study.

Challenges with implementing the methodology of this study included ensuring that participants were eligible to participate in the study, and would meet the criteria to be able to provide informed consent. Based on diagnoses of complex mental illness in a rehabilitation setting, clients may be at different stages within recovery and cognitive ability. Clients who participated in the study were to have capability of managing financial funds, as there was monetary compensation involved in the study, and they were also to have the capability to provide informed consent. However, clients who did not possess these abilities were difficult to distinguish from those who did, as they were often willing to participate, and lacked the ability to recognize that they were unable to provide consent. Appropriately carrying this portion of the method involved communicating with agency staff, and monitoring client chart databases to assess level of ability to provide consent.

These findings may be limited for agency use until data on further participants are collected in the larger study, then these \( k \) scores and DASA-IV records may be examined as a whole to depict a view of the distribution of all subjects in the study. However, the statistically significant findings of the PCL-R scores in relation to incidents of aggression may be useful for the agency when assessing, monitoring, and treating individuals with high PCL-R scores.

**Multilevel Challenges to Service Implementation**

**Overview.** The size of a sample in a research study is essential to collecting sufficient data for running statistical analyses, and examining relationships among variables. In the forensic mental health setting, challenges to acquiring a large sample size may include: clients with complex mental illness who may be unable to provide consent to treatment or to manage financial affairs. Also, some clients may have a dual-diagnosis and may require a substitute decision maker. These clients may be excluded from research if they cannot provide informed consent. Other barriers to recruiting participants may include duplicate participants. As clients in the forensic system are reviewed annually, a research study that is implemented over a number of years may encounter clients who have previously participated in the study who are still residing in the unit. Although these clients may be willing to volunteer and are capable of participating, duplicate data are not to be collected.

**Client level.** Clients may be at different stages of recovery in the rehabilitation setting. Clients experiencing more challenges as a result of complex mental illness may be excluded from participating in a study, or may have difficulties when completing an interview. Difficulties
during the interview may involve the demanding task of completing lengthy questionnaires and surveys. These participants may withdraw from the study when faced with high demands. This may also involve clients with complex mental illness who are experiencing diagnosis symptomology of paranoia, these clients may not be trustful of the regular care team, or a placement student, to provide consent or to answer any interview questions. Certain participants may become frustrated or fatigued upon survey administration. It is difficult to test a hypothesis and provide meaningful results through statistical analyses with a small sample size. Other limitations affecting the results of the study may include a gender bias in the sample, when there are more male participants than female participants as well as a ward sampling bias, then there are more participants from minimum secure forensic units than from medium secure units. Learning history, level of education, diagnosis, language barriers, and length of the interview may also affect the recruiting process and sample size.

**Program level.** When implementing a research study in a multidisciplinary setting such as a mental health hospital, communication must be conducted in an efficient and appropriate manner in order to keep the care team involved and informed. Some difficulties with conducting research and interviews involve engaging formal protocols such as sending e-mails to floor managers, making phone calls or in-person visits to units to communicate with nursing staff and the team lead, and speaking with the client’s primary nurse before the interview. Although these modes of inclusive communication are ethical and necessary, this process may present some barriers such as a delay in the recruiting process, until approved by unit managers, or postponed meetings for interviewing participants. This may also include time pressures on staff who do not have time or monetary compensation allotted to their involvement in research projects. Staff members may encounter demanding tasks and time constraints, which increases the difficulty when contacting staff members via phone or e-mail when they have limited time to offer.

**Organizational level.** Research requires financial output from the agency or a sponsor. Participants may be unable to complete the interview process and choose to withdraw from the study. Incomplete data may not be applicable for use in the study. However, participants are still provided with monetary compensation for their time. This may result in a potential loss for the organization through financially compensating participants and obtaining unusable data in return. This may also be reflected through the agency’s commitment to providing client services, which is likely to take priority over involvement in research projects. The majority of resources in a client-centered care facility are more likely to be directed towards client care, and less towards research projects.

**Societal level.** Some clients may be reluctant to engage in an interview for a research study based on stigma upheld by society’s views. This stigma may include misconceptions of the thoughts and behaviours of people who are diagnosed with complex mental illness. Stigma may be detrimental to the way in which society perceives people with mental illness. This may affect research by influencing a client’s decision to participate in the study. Some clients may be apprehensive of engaging in research where they may be asked to disclose information about personal health and mental health status and may avoid participating in a study. Stigma may also alter client patterns of responding based on the principles of reactivity to a student or staff member. When acting based on reactivity, a client may respond in a manner that they believe is more socially acceptable, rather than their real experiences, in an attempt to avoid being subject to stigma and judgement from the research investigator.
Contributions of the Study

The scope of the current literature regarding delay discounting encompasses different populations such as adolescents, adults, children with ADHD and ASD, as well as individuals with gambling and substance use disorders. Limited research has been conducted regarding the delay discounting patterns of forensic inpatients, and examining delay discounting and aggression with this population. A key implication for the behavioural psychology field of the current study was that it measured impulsivity, or delay discounting, from a behavioural perspective. This contribution may aid the behavioural psychology field in addressing the needs of diverse clientele, such as those with complex mental illness, and provide framework for conceptualizing aspects of behaviour that may contribute to incidents of aggression.

Recommendations for Future Research

Further research should be conducted with a larger sample size, and a more even distribution between sex of the participants. Other considerations for future research include obtaining larger sample size for the purpose of analyzing a more normal distribution of $k$ scores. Areas of further study may also include examining the effects of length of stay on delay discounting outcomes of forensic inpatients. Also, future research is necessary to further assess the relationship between PCL-R scores and $k$ scores. The results of this pilot study did not yield suggestions for specific clinical intervention. However, there are two implications from the current study for future research. First, it may be worthwhile to include delay discounting questionnaires throughout the intake and assessment process. This may be useful in evaluating client decision-making processes, and baseline $k$ scores as a measure of impulsivity, or rate of delay discounting. Second, it may be beneficial to analyze $k$ scores and PCL-R scores when developing plans for risk-management of potential for aggressive behaviour. This could demonstrate a reliable link between these variables. As mentioned in these modest ways, the current preliminary study could have useful clinical and research implications for a future larger sample study.

Literature review word count: 4,206

Overall word count: 14,418
References


Appendices
Appendix A: Research Ethics Board Approval

PROTOCOL APPROVAL #022/2015-02

October 5, 2015

Dr. Treven Wilkie
Department of Complex Mental Illness
Forensic Rehabilitation
Centre for Addiction and Mental Health
100 Queen St Unit 3
483
TORONTO ON M6J 1H4

Dear Dr. Wilkie:


We are writing to advise you that the Centre for Addiction and Mental Health Research Ethics Board (CAMH REB) has granted approval for the amendment to the above-named research study as described in your e-mail of October 1, 2015 (Louis Busch).

Your revised “consent form” received October 2, 2015 has been approved and a copy is attached. Subjects should receive copy of their consent form.

During the course of the research, any significant deviations from the approved protocol (that is, any deviation which would lead to an increase in risk or a decrease in benefit to human subjects) and/or any unanticipated developments within the research should be brought to the attention of the Research Ethics Office.

Best wishes for the successful completion of your project,

Susan Pilon, MHSc
Manager, Research Ethics Office
Centre for Addiction and Mental Health

S/P

cc: Louis Busch, Nimi Singh, Ross Violo, Dr. Stephanie Penney

Please retain a printed copy of this letter (and documents if applicable) for your records. Kindly quote the above reference number on any correspondence relating to this study.
 trying to be hard to read.

**Delayed Discounting Outcomes of Forensic Inpatients - Informed Consent Form**

**REB #: 022/2015**

**Study Name:** Delayed Discounting Outcomes of Forensic Inpatients

**Researchers:** Treena Wilkie, Stephanie Penney, Albert Malkin, Louis Busch, Ross Vigo, & Ryan Speciman

**Purpose of the Research:** Gain a understanding of how different populations discount varying commodities may aid in identifying and implementing empirically validated treatment protocols to help teach self-control and decrease impulsive behavior patterns. The presence of various diagnoses and mental status may predict a high degree of impulsivity contributing to maladaptive behavior patterns. For example, assessing impulsivity as it relates to time away from the in-patient unit may be utilized as an objective tool to determine the likelihood of absconding during opportunities for exposure to community inclusion.

**What You Will Be Asked to Do in the Research:** You will be asked to complete a survey with an interviewer that could take up to one hour to complete. The researchers will compare your answers to other variables within your CAMH chart (age, diagnosis, medications, progress notes, index offense, etc).

**Risks and Discomforts:** We do not foresee any risks or discomfort from your participation in the research.

**Benefits of the Research and Benefits to You:** Participation will help clinicians better understand the factors that underlie the phenomena of delay and probability discounting and may potentially inform treatment for individuals within the forensic system. It is anticipated that treatment developed based on this understanding may contribute to decreased instances of impulsive behavior which prevents this population from greater integration into the community (e.g. absconding and drug abuse).

**Voluntary Participation:** Your participation in the study is completely voluntary and you may choose to stop participating at any time. Your decision not to volunteer will not influence the treatment you are receiving at CAMH or the nature of your relationship with the researchers or study staff or the nature of your relationship with CAMH.

**Withdrawal from the Study:** You can stop participating in the study at any time, for any reason, if you so decide. Your decision to stop participating, or to refuse to answer particular questions, will not affect your relationship with the researchers, The Centre for Addiction and Mental Health, or any other group associated with this project. In the event you withdraw from the study, all associated data collected will be immediately destroyed wherever possible. If you decide to participate you will still be offered the agreed upon incentive.

**Confidentiality:** The results of the surveys you complete will be compared with a number of variables from your personal health record such as your diagnosis, your age, the number of years you have been in hospital, the nature of your index offense(s), the number of attempted or successful AWOLs reported, the content and dosage of your prescribed and as needed (PRN) medications. Other clinical information may be retrieved from your clinical chart. All
information you supply during the research will be held in confidence and unless you specifically indicate your consent, your name will not appear in any report or publication of the research. Data will be collected on handwritten notes, and then be transferred to data files on CAMH’s secure server. Your name and identifying information will be separated from your clinical information and kept in two separate locations under lock and key so that these variables cannot be matched to one another. Hard copies of your interviews and completed surveys will be safely stored in a locked facility at the Centre for Addiction and Mental Health and only research staff will have access to this information. The data will be kept for approximately 1-year, and all identifying information will be destroyed after this time (name and birthdate). Confidentiality will be provided to the fullest extent possible by law.

As part of the Research Services Quality Assurance Program, this study may be monitored and/or audited by a member of the Quality Assurance Team. Your research records and CAMH records may be reviewed during which confidentiality will be maintained as per CAMH policies and extent permitted by law.

Questions About the Research? If you have questions about the research in general or about your role in the study, please feel free to contact Dr. Padraig Darby either by telephone at (416) 535-8501, extension 36876 or by e-mail (Padraig.Darby@camh.ca). This research has been reviewed and approved by the Toronto Health Sciences Network and by CAMH’s Research Ethics Board and conforms to the standards of the Canadian Tri-Council Research Ethics guidelines. If you have any questions about this process, or about your rights as a participant in the study, please contact the Manager of Research Ethics at CAMH, Susan Pilon by email (Susan.Pilon@camh.ca) or by telephone at (416) 535-8501, extension 36352.

Legal Rights and Signatures:

I ___________________________ consent to participate in Delayed Discounting by Individuals Living with Mental Illness conducted by Treena Wilkie, Stephanie Penney, Albert Malkin, Louis Busch, Ross Violo, Nini Singh & Ryan Speedman at the Centre for Addiction and Mental Health. I have understood the nature of this project and wish to participate. I am not waiving any of my legal rights by signing this form. My signature below indicates my consent to participate in the research project and to share my health record with the researchers.

Signature ___________________________ Date ___________________________
Participant

Signature ___________________________ Date ___________________________
Principal Investigator
## Appendix B: Chart Review

### Discounting of Outcomes of Forensic In-Patient Residents Study

<table>
<thead>
<tr>
<th>Chart Review Data Collection Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant Name</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Sex</td>
</tr>
<tr>
<td>Length of Admission</td>
</tr>
<tr>
<td>Date of Admission</td>
</tr>
<tr>
<td>Index Offense(s)</td>
</tr>
<tr>
<td>Current Psychiatric Diagnoses</td>
</tr>
<tr>
<td>Diagnosis at time of last ORB Report &amp; Date</td>
</tr>
<tr>
<td>Personality Disorder Diagnoses</td>
</tr>
<tr>
<td>History of Substance Abuse?</td>
</tr>
<tr>
<td>Date of last reported use of Substances</td>
</tr>
<tr>
<td>Current Psychotropic Medications</td>
</tr>
<tr>
<td>Types of substances preferred</td>
</tr>
<tr>
<td>Current PRN Medications Prescribed</td>
</tr>
<tr>
<td>History of AWOL?</td>
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<tr>
<td>Number of AWOLs (12 Month Range)</td>
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<tr>
<td>Number of AWOLs (36 Month Range)</td>
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<tr>
<td>Psychological Functioning (IQ)</td>
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<td>Date of Psychological Assessment</td>
</tr>
<tr>
<td>PCL-R Score</td>
</tr>
<tr>
<td>BPRS Scores</td>
</tr>
<tr>
<td><strong>DASA Scores</strong></td>
</tr>
<tr>
<td>BIS-11 Scores</td>
</tr>
<tr>
<td>Hours in Seclusion (12 month range)</td>
</tr>
<tr>
<td>Score Incident Reports</td>
</tr>
<tr>
<td>HCR-20 Scores</td>
</tr>
<tr>
<td>Current Privilege Level</td>
</tr>
</tbody>
</table>
Appendix C: Dynamic Appraisal of Situational Aggression – Inpatient Version

### DASA IV  DYNAMIC APPRAISAL OF SITUATIONAL AGGRESSION

#### Step 1: Assessing Risk of Aggression

Score each item for its absence (0) or presence (1) in the last 24 hours.

- **Easily Angered**
  - 0: Absent
  - 1: Present

- **Impulsivity**
  - 0: Absent
  - 1: Present

- **Irritability**
  - 0: Absent
  - 1: Present

- **Negative Attitudes**
  - 0: Absent
  - 1: Present

- **Sensitivity to Provocation**
  - 0: Absent
  - 1: Present

- **Unwilling to follow directions**
  - 0: Absent
  - 1: Present

- **Verbal Threats**
  - 0: Absent
  - 1: Present

*(right click inside ANY box for the reference text related to this item)*

#### Total Score

#### Risk

- Low Risk (Total Score < 0.1)
- Moderate Risk (Total Score = 0.1 - 2.3)
- High Risk (Total Score > 3)

### Step 2: Recording Aggression

Rank each item for its Absence or Presence in the last 24 hours.

- **Physical Aggression towards others**
  - Absent
  - Present

- **Physical Aggression towards property or furniture**
  - Absent
  - Present

- **Verbal intimidation/threats of harm towards others**
  - Absent
  - Present
Appendix D: 27-item Monetary Choice Questionnaire

27-item Monetary Choice Questionnaires (Kirby, Petry, & Bickel, 1990)

For each of the next 27 choices, please mark which hypothetical reward you would prefer: the smaller reward today, or the larger reward in the specified number of days. While you will not actually receive the rewards, pretend you will actually be receiving the amount you indicate and answer honestly.

1. Which would you rather have?
   a. $54, today
   b. $55, 117 days from now

2. Which would you rather have?
   a. $55, today
   b. $75, 61 days from now

3. Which would you rather have?
   a. $19, today
   b. $25, 53 days from now

4. Which would you rather have?
   a. $31, today
   b. $85, 7 days from now

5. Which would you rather have?
   a. $14, today
   b. $25, 19 days from now

6. Which would you rather have?
   a. $47, today
   b. $50, 160 days from now

7. Which would you rather have?
   a. $15, today
   b. $35, 13 days from now

8. Which would you rather have?
   a. $25, today
   b. $60, 14 days from now

9. Which would you rather have?
   a. $78, today
   b. $80, 162 days from now

10. Which would you rather have?
    a. $40, today
    b. $55, 62 days from now

11. Which would you rather have?
    a. $11, today
    b. $30, 7 days from now

12. Which would you rather have?
    a. $67, today
    b. $75, 119 days from now

13. Which would you rather have?
    a. $34, today
    b. $35, 186 days from now

14. Which would you rather have?
    a. $27, today
    b. $50, 21 days from now

15. Which would you rather have?
    a. $69, today
    b. $85, 91 days from now

16. Which would you rather have?
    a. $49, today
    b. $60, 89 days from now

17. Which would you rather have?
    a. $80, today
    b. $85, 157 days from now

18. Which would you rather have?
    a. $24, today
    b. $35, 29 days from now

19. Which would you rather have?
    a. $33, today
    b. $80, 14 days from now

20. Which would you rather have?
    a. $28, today
    b. $30, 179 days from now
21. Which would you rather have?
   a. $34, today
   b. $50, 30 days from now

22. Which would you rather have?
   a. $25, today
   b. $30, 80 days from now

23. Which would you rather have?
   a. $41, today
   b. $75, 20 days from now

24. Which would you rather have?
   a. $54, today
   b. $60, 111 days from now

25. Which would you rather have?
   a. $54, today
   b. $80, 30 days from now

26. Which would you rather have?
   a. $22, today
   b. $25, 136 days from now

27. Which would you rather have?
   a. $20, today
   b. $55, 7 days from now
Appendix E: Recruitment Flyer

Invitation to Participate in Research Study:

Delayed Discounting in Forensic Patients

Are you interested in participating in a study about how people make choices about present and future outcomes?

Contact Bria Wannamaker at 416-***-**** x*****

- Leave your full name
- Leave your current location
- Leave a number you can be contacted at

Your privacy will be respected and you will be compensated for your time.
Appendix F: Informed Consent Form

Delayed Discounting Outcomes of Forensic Inpatients - Informed Consent Form

REB#: 022/2015

Study Name: Delayed Discounting Outcomes of Forensic Inpatients

Researchers: Treena Wilkie, Stephanie Penney, Louis Busch, and Ross Violo

Purpose of the Research: Gaining an understanding of how different populations discount varying commodities may aide in identifying and implementing empirically validated treatment protocols to help teach self-control and decrease impulsive behavior patterns. The presence of various diagnoses and mental status may predict a high degree of impulsivity contributing to maladaptive behavior patterns. For example, assessing impulsivity as it relates to time away from the in-patient unit may be utilized as an objective tool to determine the likelihood of absconding during opportunities for exposure to community inclusion.

What You Will Be Asked to Do in the Research: You will be asked to complete a survey with an interviewer that could take up to one hour to complete. The researchers will compare your answers to other variables within your CAMH chart (age, diagnosis, medications, progress notes, index offense, etc).

Risks and Discomforts: We do not foresee any risks or discomfort from your participation in the research.

Benefits of the Research and Benefits to You: Participation will help clinicians better understand the factors that underlie the phenomena of delay and probability discounting and may potentially inform treatment for individuals within the forensic system. It is anticipated that treatment developed based on this understanding may contribute to decreased instances of impulsive behavior which prevents this population from greater integration into the community (e.g. absconding and drug abuse).

Voluntary Participation: Your participation in the study is completely voluntary and you may choose to stop participating at any time. Your decision not to volunteer will not influence the treatment you are receiving at CAMH or the nature of your relationship with the researchers or study staff or the nature of your relationship with CAMH.

Withdrawal from the Study: You can stop participating in the study at any time, for any reason, if you so decide. Your decision to stop participating, or to refuse to answer particular questions, will not affect your relationship with the researchers, The Centre for Addiction and Mental Health, or any other group associated with this project. In the event you withdraw from the study, all associated data collected will be immediately destroyed wherever possible. If you decide to participate you will still be offered the agreed upon incentive.
Confidentiality: The results of the surveys you complete will be compared with a number of variables from your personal health record such as your diagnosis, your age, the number of years you have been in hospital, the nature of your index offense(s), the number of attempted or successful AWOLs reported, the content and dosage of your prescribed and as needed (PRN) medications. Other clinical information may be retrieved from your clinical chart. All information you supply during the research will be held in confidence and unless you specifically indicate your consent, your name will not appear in any report or publication of the research. Data will be collected on handwritten notes, and then will be transferred to data files on CAMH’s secure server. Your name and identifying information will be separated from your clinical information and kept in two separate locations under lock and key so that these variables cannot be matched to one another. Hard copies of your interviews and completed surveys will be safely stored in a locked facility at the Centre for Addiction and Mental Health and only research staff will have access to this information. The data will be kept for approximately 1-year, and all identifying information will be destroyed after this time (name and birthdate). Confidentiality will be provided to the fullest extent possible by law.

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Signature ___________________________ Date ___________________________
Participant

Signature ___________________________ Date ___________________________
Principal Investigator
Appendix G: Subject Reimbursement Form

Subject ID: ______________________________

Subject Reimbursement Receipt

Title of Study: Delayed Discounting of Forensic Inpatient Residents

Principal Investigator: Dr. Treena Wilkie

Date:

In acknowledgment of research study participation in:

Protocol Title: Delayed Discounting of Forensic Inpatient Residents

Received sum of: __________________________

Signed: _________________________________