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The purpose of this study was to compare the MMPI-2 clinical and restructured clinical scales to scores on a behavioral laboratory measure of temporal discounting. Participants were 99 college students recruited from psychology classes at a midwestern University. All students completed the MMPI-2 and the measure of temporal discounting. Specific hypotheses were made regarding probable correlations between specific scales of the MMPI-2 and the area under the curve value on the measure of temporal discounting. One of the five proposed hypotheses was supported, a significant correlation between the VRIN scale of the MMPI-2 and the area under the curve value on the measure of temporal discounting. No significant correlations were found between Scale 4 (Pd) of the MMPI-2 and temporal discounting or between Scale RC 4 (Antisocial Behavior) of the MMPI-2 and temporal discounting. In addition, no significant correlations were found between Scale 9 (Ma) of the MMPI-2 and temporal discounting or between Scale RC 9 (Hypomanic Activation) of the MMPI-2 and temporal discounting. Further analysis revealed no significant correlations between temporal discounting and other clinical or restructured clinical scales.

A PERSONALITY AND BEHAVIORAL CONCEPTUALIZATION OF IMPULSIVITY USING THE MMPI-2 AND A MEASURE OF TEMPORAL DISCOUNTING

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TABLE OF CONTENTS

ABSTRACT.....

ACKNOWLEDGEMENTS.....iii

TABLE OF CONTENTS.....iv

CHAPTER

1 INTRODUCTION.....1

2 METHOD.....19

3 RESULTS.....23

4 DISCUSSION.....26

REFERENCES.....36

APPENDICES

APPENDIX A.....40

APPENDIX B.....42

APPENDIX C.....45

CHAPTER 1

INTRODUCTION

Much human behavior is ascribed to the personality dimension of impulsivity, "a tendency to respond quickly to a given stimulus, without deliberation and evaluation of consequences" (Gerbing, Ahadi, & Patton, 1987, p. 357). The popular media often romanticize impulsivity as a natural part of youthfulness or as part of being "in love." However, impulsivity can be maladaptive and is present in a number of psychological disorders. For example, impulsivity is associated with bipolar disorder, substance related disorders, certain personality disorders, attention deficit disorder, conduct disorder, and impulse control disorders such as pathological gambling, kleptomania, pyromania, and explosive disorders (Coffey, Gudleski, Saladin, & Brady, 2003; Gerbing et al., 1987; Moeller & Dougherty, 2002; Schweizer, 2002; Swann, Pazzaglia, Nichols, Dougherty, & Moeller, 2003). Furthermore, other traits such as "sensation seeking, novelty seeking, boldness, adventuresomeness, boredom susceptibility and unreliability and unorderliness" have been linked with impulsivity (Schweizer, 2002, p. 1031).

There are disparate ways in which impulsivity can be defined. Notably, Gerbing et al. (1987) acknowledge the challenge of determining an operational definition of impulsivity, and found that measures of impulsivity often measure different constructs. Hence, they call for a more coherent framework by which to conceptualize impulsivity and suggest validating self-report measures of impulsivity with behavioral measures of impulsivity.

Self-report measures were designed to elicit responses from individuals regarding their preferences, internal traits, and typical patterns of behavior. Self-report measures

assess an individual without actually or hypothetically putting an individual in a particular situation and generally rely on the assumed honest responses of those taking the test. Some traditional self-report measures that assess dimensions of impulsivity include the 16PF Impulsivity (surgency) scale, the Guilford-Zimmerman Temperament Survey Restraint scale, the Personality Research Form Impulsivity Scale, the I-7, I-5, and the Barratt Impulsivity Scale (Gerbing et al, 1987). Self-report measures typically describe general personality traits rather than behavioral responses in particular situations. Even so, these underlying traits can be used to predict behaviors. Behavioral measures were developed to assess behavior in certain situations. This can be done by observing behavior in an actual situation or presenting an individual with a hypothetical situation. Behavioral measures also describe personality traits, but do so differently than self-report measures.

Rachlin and Green (1972) define impulsivity behaviorally as choosing smaller immediate rewards over larger delayed rewards. Although impulsivity is defined in various ways throughout the research literature, Coffey et al. (2003) assert that the aforementioned definition of impulsivity is consistent with several previous investigations and conceptualizations of impulsivity (Critchfield & Kollins, 2001; Madden, Petry, Badger, & Bickel, 1997; Richards, Zhang, Mitchell & de Wit, 1999; Schweizer, 2002). One current measure of impulsivity involves temporal discounting, the greater the delay to a future reward, the less its present, subjective value (Green, Myerson, & McFadden, 1997). For example, most people would prefer $2,000 dollars now over the same amount in 3 months. Measures of temporal discounting have shown promise in a number of studies (Crean, de Wit, & Richards, 2000; Critchfield & Kollins;

Green et al.; Madden et al.; Simpson & Vuchinich, 2000; Vuchinich & Simpson, 1998). In fact, Moeller and Dougherty (2002) state that this behavioral laboratory measure of temporal discounting is the most frequently studied measure with substance abusers.

In seeking to understand behavioral correlates of impulsivity, research has often disagreed on whether impulsivity can be better understood as an enduring personality trait or situation-specific behavioral trait. Mischel and Shoda (1998) describe this phenomenon by stating "Throughout the history of the field, two different approaches to personality have competed (often bitterly) in the search for an adequate theory of the person as an individual and of the important differences between persons" (p. 1). On one hand, Tcheremissine, Lane, Cherek, and Pietras (2003) describe impulsivity as a personality trait that may underlie certain behaviors. On the other hand, Coffey et al. (2003) describe impulsivity as a behavioral trait. Other research highlights this disparity and suggests that definitions of impulsivity and corresponding measurement techniques are generally classified within two dimensions: behavioral and cognitive (Crean et al., 2000). Moeller and Dougherty (2002), however, define impulsivity as "a predisposition toward rapid, unplanned reactions to internal or external stimuli without regard to the negative consequences of these reactions to themselves or others" (p. 3). The use of the word "predisposition" acknowledges a personality component of impulsivity, yet accepts situations as being partially responsible for impulsive behavior. Mischel and Shoda acknowledge the contribution of both approaches, yet note that these disparate conceptualizations of personality leave an important gap. They underscore the timeliness of personality research by stating "given this history, the field is now at a major choice point: to try to carve an overarching framework that integrates the two disciplines to

pursue both goals within one field, or to show that such an integration is impossible or unconstructive" (p. 2). Similarly, Gerbing et al. (1987) posit that if personality theory wishes to increase its credibility in predicting behavior, then some overlap between personality and behavioral measures must develop. Primarily, a clearer, more specific understanding of personality and behavioral conceptualizations of various aspects of personality is needed.

Some studies have examined the concurrence of personality and behavioral measures (Coffey et al., 2003; Crean et al., 2000; Gallucci, 1997; Gerbing et al., 1987; Kollins, 2003; Madden et al., 1997; Vuchnich & Simpson, 1998). Of these, some have found moderate correlations between self-report measures of impulsivity and a measure of temporal discounting (Kollins; Madden et al.). Others have found weak or no correlations between self-report and behavioral measures (Coffey et al.; Crean et al.; Vuchnich & Simpson).

According to Moeller and Dougherty (2002), temporal discounting is the most frequently studied behavioral laboratory measure of impulsivity. Similarly, the MMPI-2 has been described as "the most widely used personality inventory" (Butcher, 1999, vii). Although research has examined correlations between temporal discounting and various personality measures (Crean et al., 2000; Vuchnich & Simpson, 1998) and between forms of the MMPI and behavioral measures (Gallucci, 1997), no research has specifically examined the relationship between scales on the MMPI-2 and temporal discounting. Hence, examining the relationship between these commonly used behavioral and personality measures will both add to the further conceptualization of impulsivity that is

called for in research (e.g., Gerbing et al., 1998) and increase the clinical utility of these instruments.

Temporal Discounting

Background and Validity

Critchfield and Kollins (2001) acknowledge the difficulty of conceptualizing "socially important problems" in laboratory environments. Even so, many difficulties also arise when attempting to measure these behaviors as they occur in the natural environment. Primarily, certain behaviors may not be available for direct observation or experimental manipulation. Furthermore, behaviors often occur over extended time frames, making it difficult to determine the relationship between responses and consequences (Critchfield & Kollins).

Several studies have found a relationship between measures of temporal discounting and behaviors in the natural environment—lending credence to the utility of this measure (Coffey et al., 2003; Crean et al., 2000; Kollins et al., 2003; Madden et al., 1997; Vuchinich & Simpson, 1998). For example, Madden et al. and Coffey et al. examined the discounting of monetary rewards and the discounting of drug "rewards" in substance dependent individuals. Both studies found that substance dependent subjects discounted monetary rewards at a faster rate than controls and discounted drug "rewards" at a faster rate than monetary rewards. Coffey et al. note strengths and weaknesses of this measure of temporal discounting. Primarily, temporal discounting tasks measure current decision making, whereas self-report measures do not include a time reference. In addition, temporal discounting may represent a specific behavioral component of impulsivity that is related to drug use. One limitation of temporal discounting noted by

Coffey et al. and Madden et al. is the inability to determine cause and effect between impulsivity and drug use. In other words, is faster discounting of delayed rewards predictive of future drug abuse or does drug abuse lead to faster delay discounting? Samples used in both these studies were relatively small. For example, Richards et al. used 18 subjects in the experimental condition and Coffey et al. used 12 subjects in the experimental condition. In addition, both studies acknowledge the inability to control all variables between substance dependent and control groups.

Crean et al. (2000) found that psychiatric outpatients who, based on their diagnosis, were at a high risk of engaging in impulsive behaviors discounted delayed rewards more sharply than a closely matched group. Crean et al. note that this lends credibility to this measure as "a sensitive and valid quantitative measure of at least one form of impulsivity" (p. 160). Limitations acknowledged in this study are that the subjects were fairly heterogeneous and may have been taking psychotropic medications that could have influenced their performance.

Vuchnich and Simpson (1998) found that heavy social drinkers and problem drinkers showed greater temporal discounting than light social drinkers. Like Coffey et al. and Madden et al., Vuchnich and Simpson acknowledge that the correlational nature of their research prevents the drawing of cause and effect conclusions about alcohol use and temporal discounting. Furthermore, this measure of temporal discounting does not provide insight into the previous or current conditions that produced varying degrees of discounting. Even so, Vuchnich and Simpson noted the potential of utilizing temporal discounting with substance abusing populations.

General strengths and limitations of temporal discounting procedures are noted and addressed throughout research literature. Critchfield and Kollins (2001) note that by utilizing a hypothetical situation, temporal discounting procedures may be able to manipulate meaningful magnitudes of delay and reward and thus provide information that is difficult to obtain in the natural environment. Although use of hypothetical situations may make temporal discounting a viable alternative to directly observing behaviors, use of hypothetical situations have also produced some questions about reliability and validity of this measure (Madden et al., 1997).

Questions about the reliability and validity of temporal discounting measures have been addressed in research. First, one concern about temporal discounting procedures is that subjects obtain no within-study experience with the "consequences" of interest. Hence, subjects may demonstrate the "effects" of these consequences through verbal responses that may not be related to the behavior they describe (Critchfield & Kollins, 2001). However, Critchfield and Kollins (2001) posit that although contact with real consequences does not take place in laboratory settings, subjects generally have considerable experiences with the hypothetical consequences (i.e. earning and spending money). Furthermore, Madden et al. (1997) state that much research suggests that choices between hypothetical rewards produce valid delay discounting. Second, laboratory measures of temporal discounting are often short in duration which raises questions about long term stability of results. Even so, a few studies have used real, rather than hypothetical consequences and found results similar to studies that used temporal discounting (Crean et al., 2000). Hence, this measure of impulsivity has been

used in understanding socially important behaviors such as substance use disorders and psychological disorders.

Substance Use Disorders

Impulsivity is implemented in the development and maintenance of substance use disorders (Kollins, 2002). Temporal discounting, a behavioral measure of impulsivity, has shown promise in a number of studies by differentiating individuals based on their typical consumption of substances (Coffey et al., 2003; Kollins, 2002; Madden et al., 1997; Vuchinich & Simpson, 1998). Specifically, temporal discounting has differentiated individuals based on degree of substance use. In describing the applicability of temporal discounting in understanding substance use disorders, Critchfield and Kollins (2001) state, "most excessive drinking and drug use does not take place in a professional office or in a treatment program, and thus bears inspection in the natural environment" (p. 113). Hence, impulsivity is conceptualized within the hypothetical context of choosing between smaller sooner rewards and larger later rewards. Coffey et al. compared the temporal discounting scores of crack/cocaine dependent individuals and matched controls. They found that crack/cocaine-dependent participants discounted monetary rewards at a higher rate than matched controls. Furthermore, crack/cocaine dependent participants discounted crack/cocaine "rewards" at a higher rate than monetary rewards. Similarly, Madden et al. (1997) found that opioid-dependent participants discounted monetary rewards at a faster rate than controls and discounted heroin significantly more than monetary rewards.

Vuchnich and Simpson (1998) distinguished participants by typical alcohol consumption and found that heavy social drinkers and problem drinkers showed greater temporal discounting than light social drinkers. Additionally, in a general study of

substance use, Kollins (2003) found that discounting values were significantly associated with a number of substance use variables, including age of first alcohol use, age of first smoking, age of first marijuana use, number of times "passed out" from alcohol use and total number if illicit drugs used.

Psychological Disorders

Impulsivity is implemented in a number of psychological disorders, and temporal discounting has been used to measure impulsivity in studies of psychological disorders. For example, Crean et al. (2000) studied psychiatric outpatients receiving treatment. Participants were divided into low risk and high risk groups based on their Diagnostic and Statistical Manual of Mental Disorders (4^{th} edition) diagnoses (e.g. participants with diagnoses of substance dependence or abuse, borderline personality disorders, and bipolar disorder were assigned to the high-risk group.) This study found that high-risk participants exhibited steeper delay than low-risk participants, meaning that they valued delayed rewards less than the low risk group. Furthermore, in a review of literature, Critchfield and Kollins (2001) noted the utility of temporal discounting in understanding the functional components of Attention Deficit Hyperactivity Disorder.

Minnesota Multiphasic Personality Inventory

MMPI-2 Background and Validity

Research has acknowledged the MMPI as the most widely researched and broadly used personality instrument (Butcher, 1999). The MMPI, a 567 question self-report personality inventory, was originally developed by Hathaway and McKinley in 1943 for the primary purpose of attaching diagnostic labels to clients (Graham, 2000).

Butcher (1999) acknowledges the long history of self report inventories designed to obtain "personality-based" information about individuals. For example, Butcher states that the use of self-report methods can be traced back to the 19th century when Francis Galton explored ways to have people rate themselves on personality factors. However, the MMPI differs from typical self-report measures on several dimensions. First, most self-report inventories are rationally derived and based on loosely defined theoretical constructs (Butcher). In contrast, the MMPI was developed using the empirical keying approach, which means that items are used not because of face validity, but because item analysis has revealed that they can reliably discriminate between people with different diagnoses (Graham, 2000). Second, one criticism of self-report inventories is that they provide the opportunity for less than honest responses (Davis & Palladino, 2003). However, the MMPI has validity scales designed to identify deviant test-taking attitudes. For example, the L scale identifies test-takers who try to present themselves in an unrealistically favorable way. An elevation on the F scale indicates that items in this scale were endorsed in that direction by less than 10% of the normal population. Elevations on the K scale reflect a defensive test taking attitude (Graham). These scales allow for caution in interpreting profiles that may have questionable validity and elimination of those that are obviously invalid.

Revisions of the MMPI

Although the original MMPI was widely used, it was revised and republished in 1989 after improvements were made in standardization, language, and depth of item pool. According to Butcher (1990), this revision was the first major revision in 50 years.

In describing the MMPI-2, Butcher states "it provides a broadened set of personality and clinical measures in addition to the traditional scales that have worked so well for so long" (p. vii). The traditional clinical scales of the MMPI include (1) Hypocondriasis, (2) Depression, (3) Hysteria, (4) Psychopathic Deviate, (5) Masculinity-Feminity, (6) Paranoia, (7) Psychastenia, (8) Schizophrenia, (9) Hypomania, (0) Social introversion.

As predicted, after the restandardization project, the MMPI-2 remained a widely used and researched personality instrument (Butcher, 1999). Even so, developers and proponents of the MMPI have continued to increase the validity and clinical utility of this instrument. Thus, shortly after the restandardization of the original MMPI, researchers began work on the Restructured Clinical Scales (Tellegen, 2003). Those who participated in the restandardization project recognized this as the next step in increasing the clinical utility of the MMPI-2. In the original restandardization project, the clinical scales remained virtually unchanged (Tellegen). Consequently, Tellegen states that the next logical step was to explore possible modifications to the clinical scales.

Similar to the first restandardization project, in developing the Restructured Clinical Scales, Tellegen (2003) states that an effort was made to "preserve the valuable predictive features of the Clinical Scales, while attempting to improve their distinctiveness" (p. 2). Ben-Porath (2003) notes that validation analyses found that the Restructured Clinical Scales have enhanced discriminant validity. Similar to the Content, Supplementary, and Harris Lingoes Scales, the Restructured Clinical Scales can provide a more precise view of specific symptoms that comprise scale elevations (Ben Porath).

There is a call for more research on the Restructured Clinical Scales. It is important to note that creation of the Restructured Clinical Scales does not indicate that

the original Clinical Scales will be discontinued. Rather, there is a call for future research to define the relative contributions of both the Clinical and Restructured Clinical Scales in MMPI-2 interpretation (RC Scales FAQs).

Substance Use Disorders

In addition to being the most widely used personality inventory, the MMPI is the most frequently used personality instrument in examining the personality of substance abusers (Craig & Olson, 1992). Notably, in MMPI interpretation, impulsivity is often linked with substance use disorders. Graham (2000) describes specific profile configurations of individuals who are likely to have substance use disorders. For example, persons with elevations on Scales 2 and 4 are impulsive and unable to delay gratification. In these individuals, problem behaviors may be related to excessive use of alcohol and other drugs (Graham). Elevations on Scales 4 and 8 are indicative of persons who are erratic and unpredictable in their behavior. Incidentally, excessive drinking and drug abuse may also occur in individuals with this profile configuration. Furthermore, individuals with elevations on Scales 4 and 9 are described as impulsive and unable to delay gratification of impulses. Notably, Graham states that this is a common code-type among those who abuse alcohol and other drugs.

Varieties of research have been conducted on the use of the MMPI and MMPI-2 in describing and predicting maladaptive patterns of substance use. This research has generally supported the use of clinical scales in understanding this behavior (Craig & Olson, 1992; Donovan, Soldz, Kelley, & Penk, 1998; Martin, Hewett, Baker & Haertzen, 1977; Sutker, Brantley & Allain, 1980). Profile patterns consistent with those mentioned by Graham (2000) often emerge with substance dependent individuals. For example,

Sutker et al. examined the MMPI profiles of 617 DUI offenders and found that four "prototypic" profile patterns emerged. Sutker et al. state that the four patterns were characterized by elevations on Scale 4, Scale 9, Scales 2 and 4, and Scales 4 and 9. These profile patterns also differentiated participants by level of alcohol consumption.

Similarly, Donovan et al. (1998) compared the MMPI profiles of alcoholics, herion addicts, cocaine addicts, and polydrug addicts. Donovan et al. found that although these profiles share similarities, that distinctions can be made between groups. Specifically, Discriminant Functional Analysis revealed that alcoholics exhibited less dramatic scale elevations. Furthermore, alcoholics did not demonstrate the severe psychiatric symptomology that was exhibited by other groups. Donovan et al. were also able to differentiate heroin and cocaine abusers and found, based on MMPI profiles, that heroin users appear more depressed and alienated, whereas cocaine abusers are characterized by lability of mood, excitability and impulsivity. Finally, polydrug abusers represent the most severe sector and generally exhibit MMPI profiles that indicate acute disturbance, paranoid thinking, and profound anxiety.

Consistent with previous research, Martin, Hewett, Baker, and Haertzen (1977) proposed that an important dimension of drug addiction was the presence of certain need states that give rise to impulsivity. Martin et al. administered the MMPI to 54 control subjects, 53 alcoholics, and 24 prisoner drug abusers and found that alcoholics and prisoners had significantly elevated scores on the Psychopathic Deviate (4), Hypomania (9), and Depression scales (2). Craig and Olson (1992) examined the MMPIs of 104 cocaine abusers in treatment and found that two basic profile types emerged. Type 1 consisted of a spike on the Psychopathic Deviate (4) scale with all other scales below

T70, and Type 2 consisted of significant elevations on F, and all clinical scales except Masculinity-Femininity (5) and Social Introversion (0).

Psychological Disorders

Although the original purpose of the MMPI was to attach psychodiagnostic labels to patients, patients with a particular diagnosis often obtained high scores on a number of clinical scales as opposed to only the scale that corresponded with their diagnosis. Subsequently, an alternative approach to MMPI interpretation suggested the use of profile configurations in helping clinicians generate descriptions and inferences about individuals. In general, reliable extratest correlates can be identified for profiles that are classified according to their two highest clinical scales (Graham, 2000). Understanding these profiles can assist clinicians in making appropriate diagnoses. Research has been conducted on scales and scale configurations that underlie psychological disorders and certain personality characteristics such as impulsivity.

Impulsivity is often characterized as a personality characteristic and has been found to underlie a number of psychological disorders. For example, Swann et al. (2003) implicate impulsivity with bipolar disorder and state that it is difficult to meet criteria for a manic episode without impulsive behavior. Impulsivity is also present in specific personality disorders such as Borderline Personality Disorder. Serper at al. (1993) report that the MMPI is likely the most widely used psychological instrument in describing Schizotypal and Borderline Personality Disorder. They studied the differences between people with Schizotypal Personality Disorder and Borderline Personality disorder using various measures. Included among those measures was the MMPI. Serper et al. found that those with Borderline Personality Disorder scored significantly higher on Scale 4

(Pd) then those with Schizotypal Personality Disorder. Notably, impulsive behavior is a primary component of Borderline Personality Disorder and can be represented by elevations on certain clinical scales. Specifically, Scale 4 (Pd) represents a measure of impulsivity, frustration tolerance, and risk taking.

Concurrence of Behavioral and Personality Measures

Gerbing et al. (1987) suggested that concentrating on validating self-report measures of impulsivity with behavioral measures of impulsivity. Furthermore, Gerbing et al. (citing Barratt 1985) suggested that if personality theory is to provide evidence of its ability to describe and predict behaviors, a model that is more integrated across behavioral and personality domains must emerge. Similarly, Crean et al. (2000) note the wealth of literature on the topic of impulsivity but suggest that more work is needed to define impulsivity both methodologically and conceptually. Indeed, since Gerbing et al.'s call for research, some research has been conducted on validating self report and behavioral measures of impulsivity.

Of this research, some studies have found moderate correlations between self-report measures of impulsivity and temporal discounting (Madden et al., 1997; Richards, Zhang, Mitchell, & de Wit, 1999). For example, Richards et al. (1999) had adult volunteers ingest a moderate dose of ethanol or a placebo before completing the discounting task. Their study yielded several findings, among which was the positive correlation of temporal discounting with self-report measures of impulsivity. The self-report measures included the Impulsiveness-Venturesomeness-Empathy Questionnaire, Eysenck Personality Inventory, and the Sensation Seeking Scale. Richards et al. found positive correlations between the k values for delay discounting and scores on the

Impulsivity and Extroversion scales of the Eysenck Personality Inventory, and the Disinhibition scale of the Sensation Seeking Scale. No statistically significant correlations were found between temporal discounting and the Impulsiveness-Venturesomeness-Empathy Questionnaire. Richards et al. noted the importance of this finding, in that questions on these personality measures do not generally refer to discounting of future consequences.

Similarly, Madden et al. (1997) investigated temporal discounting in opiod-dependent and non-drug using participants. Along with completing a temporal discounting measure, participants completed the Eysenck Personality Questionnaire. Scores on the impulsivity subscale of the Eysenck Personality Questionnaire were significantly higher for the opioid-dependent participants than matched control participants. Similarly, correlations between Impulsivity scores and discounting scores (k) were similar in the two groups (Madden et al.)

Other research has found no correlations between self-report measures of impulsivity and temporal discounting (Coffey et al., 2003; Crean et al., 2000; Vuchnich & Simpson, 1998). For example, Coffey et al. administered delay discounting and self-report impulsivity measures to crack cocaine dependent subjects and non-drug using subjects and found no correlations between self-report measures of impulsivity and the estimated discounting parameter scores for either group. Self-report measures used included the Barrett Impulsivity Scale and the Eysenck Impulsiveness Questionnaire (I7). Interestingly, however, cocaine dependent subjects scored significantly higher than the matched control group on both the Barrett Impulsivity Scale and the Eysenck Impulsiveness Questionnaire. Nevertheless, no correlations were found between

estimated parameter values in temporal discounting and the self-report measure (Coffey et al.). Similarly, Crean et al. examined impulsivity in psychiatric outpatients by using a measure of temporal discounting and the I7 impulsivity factor. No correlations were found between temporal discounting and the I7 impulsivity factor. Finally, Vuchinich and Simpson (1998) found that heavy social drinkers and problem drinkers showed greater temporal discounting than light social drinkers. However, no correlations were found between temporal discounting and three self-report measures of impulsivity.

Gallucci (1997) administered the MMPI-A to 88 male and 92 female adolescents receiving treatment for substance abuse. Therapists were asked to rate clients on dimensions such as impulsivity and sensation seeking. Positive correlations were found between MMPI-A substance abuse scales and dimensions referencing behavioral undercontrol. Although this demonstrates the predictive validity of the MMPI-A, it should be noted that no correlations were examined between clinical scales and therapists behavioral ratings.

Although previous research is somewhat inconsistent in its findings regarding the correlations between behavioral and personality measures of impulsivity, the current study differs from previous research in several ways. First, no studies have ever sought to determine correlations between temporal discounting and the MMPI-2. This is significant in that the MMPI-2 is described as the most widely used and researched personality instrument in psychology (Butcher, 1999). Similarly, temporal discounting is the most frequently studied behavioral laboratory measure of impulsivity (Moeller and Dougherty, 2002). Second, previous studies that have examined the relationship between temporal discounting and self-report measures have used measures designed with the

logical keying approach that have face validity, but that have no reliability or validity indicators (Coffey et al., 2003; Crean et al., 2000; Madden et al., 1997; Richards, Zhang, Mitchell, & de Wit, 1999; Vuchnich & Simpson, 1998). In contrast, the MMPI-2 represents the empirical keying approach and has validity indicators. Third, the MMPI-2 yields different scores on different scales, lending itself a top-down approach by which correlations can be computed between the estimated parameter values (k) of the temporal discounting measure and scales of the MMPI-2. Fourth, new MMPI-2 scales have been developed and there is a call for more research on these scales (RC Scales FAQ's).

Hypotheses

This study investigated the correlations between temporal discounting and the traditional clinical scales and restructured clinical scales of the MMPI-2. The following hypotheses were tested:

1. A correlation will exist between Scale 4 (Pd) of the MMPI-2 and the temporal discounting measure.
2. A correlation will exist between Scale RC 4 (Antisocial Behavior) of the MMPI-2 and the temporal discounting measure.
3. A correlation will exist between Scale 9 (Ma) of the MMPI-2 and the temporal discounting measure.
4. A correlation will exist between Scale RC 9 (Hypomanic Activation) of the MMPI-2 and the temporal discounting measure.
5. A correlation will exist between the VRIN Scale of the MMPI-2 and the temporal discounting measure.

CHAPTER 2

METHOD

Participants and Design

Participants included a total sample of 99 college students enrolled in psychology courses at a Midwestern University. However, four participants did not complete the measures in the allotted two-hour time period. Incomplete data were not used in statistical analysis, which left a total of 95 participants. Participants ranged in age from 18 to 42 ($M = 21.41$, $SD = 4.449$). Of the sample, 29.5% were male and 70.5% were female. In exchange for their participation, participants enrolled in Introductory or Developmental Psychology received two research points that counted toward a course requirement. Upper-division psychology students were given the opportunity to receive extra-credit in exchange for participation. The course instructor determined the amount of extra credit.

A correlational design was used to explore relationships between temporal discounting and MMPI-2 scores. Pearson *r* tests were conducted to determine correlations between the area under the curve "parameter" and clinical, validity, and restructured clinical scales of the MMPI-2.

Instruments and Procedures

Informed Consent Document. An Informed Consent Document was used to obtain consent for participation (Appendix A).

Demographic Questionnaire. Participants also completed a brief Demographic Questionnaire developed by the researcher. The questionnaire included questions related

to gender, age, level of education, alcohol and drug use, and treatment for psychological disorders (Appendix B).

Temporal Discounting Measure. The temporal discounting measure used in this study presented monetary values at various time frames which included: 1 month, 6 months, 1 year, 3 years, 5 years, and 10 years (Atteberry & Critchfield, 2002). This measure of temporal discounting presented the aforementioned time frames on different flow charts. On each chart, the respondent had the option of choosing a smaller immediate reward or a larger delayed reward (see Appendix C). Respondent's choices determined values on following questions and determined the final value for each time frame (Myerson, Green, & Warusawitharana, 2001)

The estimated parameter values of the temporal discounting measure were derived by examining the k value in the hyperbolic discounting equation ($A/(1 + kD)$). For example, larger k values indicate more devaluation of the hypothecial reinforcer due to delay (Crean et al., 2000). The discounting value is also conceptualized by examining the area under the curve. This analysis, described by Myerson et al. (2001), calculates the total area under the curve for each participant by using the subjective value of all time frames, and this was the measure used in this study.

Validation studies have yet to be performed on the specific temporal discounting measure used in this study. However, Vogts-Scribner (2003) suggested that this temporal discounting measure has yielded information similar to that yielded by traditional laboratory procedures (Atteberry & Critchfield, 2002).

The MMPI-2. All 567 items of the MMPI-2 were completed by respondents. The MMPI-2 is described as the most widely used personality inventory. Although originally

designed to aid clinicians in assigning psychodiagnostic labels to patients, the MMPI-2 is currently used to provide information about general personality characteristics as well as diagnostic information (Graham, 2000). Hence, this type of interpretation makes it possible to generate descriptions and inferences about "normal" persons and clients. It is this type of interpretation that makes the MMPI-2 relevant in studies of non-clinical populations.

The MMPI-2 is easily administered and can be scored by computerized procedures or by hand. It can be administered either individually or in groups and generally takes between 1 to 1.5 hours to complete. It is designed for use with persons who are 18 years of age or older (Graham, 2000). For valid completion of the MMPI-2, test-takers should possess a minimum of an eighth grade reading level. The MMPI-2 yields scores on a number of different scales. For the purposes of this study, scores from the traditional Clinical Scales and the Restructured Clinical scales were examined. Traditional clinical scales include (1) Hypocondriasis, (2) Depression, (3) Hysteria, (4) Psychopathic Deviate, (5) Masculinity-Feminity, (6) Paranoia, (7) Psychastenia, (8) Schizophrenia, (9) Hypomania, (0) Social introversion. The restructured clinical scales include (RCd) Demoralization, (RC1) Somatic Complaints, (RC2) Low Positive Emotions, (RC3) Cynicism, (RC4) Antisocial Behavior, (Rc6) Ideas of Persecuton, (RC7) Dysfunctional Negative Emotions, (RC8) Aberrant Experiences, (RC9) Hypomanic Activaion. On all scales, a *T* score of greater than 65 is considered a clinical elevation. When more than one scale is elevated, the profile configurations of individuals are considered.

The MMPI-2 contains validity indicators, which include a "cannot say" score, an (L) or lie scale, an (F) or infrequency scale, and a (K) defensiveness scale. Scores on these scales that are above designated cut-offs can invalidate a profile. Specifically, an MMPI-2 profile should be considered invalid if the test-taker omits more than 30 items, produces a *T* score greater than 65 on the L or K scales, obtains a *T* score greater than 80 on the VRIN scale, or has a *T* score greater than 100 on the F scale. However, in samples of the general population, research indicates that a *T*-score of 85 on the F scale is a more appropriate cutoff (Butcher, 1999). Hence, a *T*-score cutoff of 85 on the F scale was utilized in this study. Clinical elevations on these validity scales may indicate that test-takers are producing less than honest responses. Data analysis was conducted initially with all profiles included and subsequently with only valid profiles included.

CHAPTER 3

RESULTS

After data collection, measures were scored and entered into SPSS 11.5, the statistical program used for data analysis. Subsequently, a series of Pearson *r* correlations were calculated to examine the relationship between variables cited in the hypotheses. Specifically, Pearsons *r* correlations examined the relationship between Scale 4 (Pd) of the MMPI-2 and the temporal discounting parameter, Scale RC 4 (Antisocial Behavior) of the MMPI-2 and temporal discounting, Scale 9 (Ma) of the MMPI-2 and temporal discounting, RC 9 (Hypomanic Activation) of the MMPI-2 and temporal discounting, and the VRIN scale of the MMPI-2 and temporal discounting.

In entering the data, T scores were entered for the MMPI-2 clinical (K-Corrected) and restructured clinical scales. The temporal discounting value was determined by using a formula presented by Myerson et al. (2001). This formula calculates the total area under the curve by using the 6 time frames presented in the measure. It should be noted that smaller numerical values yielded by this measure indicate a steeper discounting curve or rapid discounting of hypothetical amounts of money. In contrast, larger numerical values indicate a larger area under the curve and slower discounting of hypothetical monetary rewards.

Although 99 participants were in the study, four participants did not complete the MMPI-2 in the allotted two-hour time period. Data from these incomplete profiles were not used in the statistical analysis. Thus, statistical analysis was conducted with all 95 profiles. However, in a subsequent statistical analysis, 14 invalid profiles were excluded based on T-score cutoffs recommended by Graham (2000). Specifically, profiles were

considered invalid if the scores on the L and K scales were greater than 65. In addition, profiles were excluded if VRIN was greater than 80 and if F was greater than 85. An alpha level of .05 was used to test for significance.

Comparisons Between MMPI-2 Scales and Temporal Discounting

One of the five proposed hypotheses was supported. The four hypotheses that were not supported were non-significant regardless of whether all profiles were used in the analysis or invalid profiles were excluded. The values reported for the four non-significant hypotheses were obtained from the analysis conducted on the valid profiles only. Hypothesis 1, predicting a significant correlation between Scale 4 (Pd) of the MMPI-2 and the temporal discounting measure, was not supported $r(79) = .14, p = .21$. Similarly, Hypothesis 2, predicting a significant correlation between scale RC 4 (Antisocial Behavior) of the MMPI-2 and the temporal discounting measure, was not supported $r(79) = .15, p = .18$. Furthermore, Hypotheses 3 and 4 were not supported. Specifically, no significant correlations emerged between Scale 9 (Ma) of the MMPI-2 and the temporal discounting measure $r(79) = -.09, p = .42$ or between RC 9 (Hypomanic Activation) and the temporal discounting measure $r(79) = -.10, p = .39$. However, when all profiles were included, Hypothesis 5 was supported. A Pearson *r* revealed a significant correlation between the validity scale VRIN of the MMPI-2 and the numerical temporal discounting value $r(93) = -.26, p = .01$. Specifically, individuals who discounted monetary rewards more quickly, scored higher on the VRIN scale, meaning they responded inconsistently to MMPI-2 items. No other significant correlations emerged between the MMPI-2 scales utilized in this study and the measure of temporal discounting. It should be noted that distribution of MMPI-2 scores was relatively

consistent with descriptions of the instrument cited in research (Graham, 2000). In addition, correlations between the clinical and restructured clinical scales were similar to that described in literature (Tellegen, Ben-Porath, McNulty, Arbisi, Graham, & Kaemmer, 2003).

Exploratory Analyses

Another notable correlation was found between the temporal discounting parameter and self-reported drug use within the past 30 days. Specifically, the more reported days of drug use within the last 30 days, the steeper the discounting curve $r(11) = -.24$, $p = .02$). Exploratory analysis also examined the relationship between smoking and temporal discounting. An independent samples *t* test revealed no significant differences between non-smoking ($M = .45$, $SD = .31$) and smoking groups on the area under the curve parameter on the measure of temporal discounting *($M = .41$, $SD = .32$), $t(8) = .42$, $p = .93$.* Specifically, individuals who reported smoking did not discount monetary rewards more quickly than non-smokers. In addition, a *t* test revealed no significant differences between non-drug using ($M = .42$, $SD = .32$) and drug using groups and the area under the curve parameter on the temporal discounting measure *($M = .48$, $SD = .31$), $t(31) = -.94$, $p = .66$.* In other words, students who reported using drugs did not discount monetary rewards more quickly than those who reported not using drugs.

CHAPTER 4

DISCUSSION

The purpose of this study was to examine the relationship between scales on the MMPI-2 and the "area under the curve" parameter yielded by a measure of temporal discounting. Data used in the analysis of these measures was collected from 99 college students at a Midwestern University. This examination was conducted to add to the clinical utility of these instruments, and contribute to personality research more broadly. Specifically, some researchers have debated about whether impulsivity can best be described as an enduring personality trait, or as a situation specific behavioral trait (Mischel & Shoda, 1998). An examination of the concurrence of specific measures exploring personality and behavioral traits can help settle this long-standing discussion.

Support for Research Hypotheses

Hypothesis 5 predicted the existence of a correlation between the VRIN scale of MMPI-2 and the temporal discounting measure. This hypothesis was supported. Specifically, the quicker participants discounted hypothetical amounts of money, the higher the VRIN score on the MMPI-2. According to Graham (2000), the VRIN scale was developed to identify persons who responded to MMPI-2 items inconsistently. People with high VRIN scores likely did not read the content of the items and responded in a random or near random pattern. In this study, there were 2 elevated VRIN scores. High VRIN scores may also indicate poor reading ability or inability to understand the questions. In contrast to the clinical scales, there are few personality or behavioral descriptions of individuals with elevated VRIN scores. Even so, it seems intuitive that those who cannot take time to thoroughly read questions of the MMPI-2 may not be able

to wait for monetary rewards. Notably, this correlation between temporal discounting and the VRIN scale may allow for additional interpretation of profiles with elevated VRIN scores. Although a number of variables may be related to elevated VRIN scores, inability to delay gratification may be a characteristic of individuals who receive an elevated score on this scale. However, there are reasons why elevated VRIN scores are not likely due to poor reading ability. First, four profiles were initially excluded because individuals did not complete them in the allotted two hour time period. Hence, those with reading difficulty may have been "screened out" before data analysis. Second, even those with elevated VRIN scores had appropriately completed temporal discounting measures. It is likely that if reading ability caused the elevated VRIN scores, it would have also caused invalid temporal discounting measures.

Unsupported Research Hypotheses

Hypothesis 1 predicted a significant correlation between Scale 4 (Pd) of the MMPI-2 and the temporal discounting measure. Specifically, it was predicted that the higher the scores on Scale 4 of the MMPI-2, the more quickly participants would discount hypothetical monetary rewards presented in the temporal discounting measure. This hypothesis was not supported.

Originally, this hypothesis was proposed, in large part, because descriptions of individuals with high scores on Scale 4 included personality characteristics such as impulsivity. Specifically, Graham (2000) notes that persons who score high on this scale "are impulsive and strive for immediate gratification of impulses" (p. 71). In addition, individuals who score high on this scale do not plan their behavior well (Graham). Similarly, people who discount at a high level, as measured by the temporal discounting

measure are often described in research as displaying behavioral traits related to impulsivity and self-control (Bickel & Vuchinich, 2000).

When described verbally, it seems intuitive that significant correlations should emerge between Scale 4 (Pd) of the MMPI-2 and the temporal discounting measure. However, it is important to note that "impulsivity" is defined in various ways throughout psychological literature. Gerbing et al. (1987) acknowledge the challenge of finding a single definition of impulsivity and note that instruments measuring impulsivity may be measuring different constructs. Indeed, this may be the case in comparing Scale 4 (Pd) and the temporal discounting value. Specifically, the behavioral act of choosing hypothetical monetary rewards based on time and monetary value may represent a different underlying component of impulsivity than is measured on Scale 4 (Pd) of the MMPI-2. In addition, although impulsivity is cited as a personality characteristic of those with high scores on Scale 4 (Pd), this scale is not cited in research as being a "pure" measure of impulsivity. Graham (2000) notes that high scores on this scale tend to be associated with difficulty incorporating the values of society and are likely to engage in asocial, antisocial or criminal behaviors. On the other hand, measures of temporal discounting have been studied largely in terms of substance abusing populations (Bickel & Vuchinich, 2000). Although it is likely that substance abuse contributes to antisocial behaviors, there is not a perfect overlap.

Hypothesis 2 predicted a significant correlation between Scale RC 4 (Antisocial Behavior) of the MMPI-2 and the temporal discounting measure. Specifically, it was predicted that the higher the scores on RC 4 of the MMPI-2, the more quickly participants would discount hypothetical monetary rewards presented in the temporal

discounting measure (i.e. the steeper the discounting curve). No significant correlations emerged between RC 4 of the MMPI-2 and the measure of temporal discounting. It should be noted that although RC 4 (Antisocial Behavior), and clinical scale 4 (Pd) are comparable, there are some differences in scale interpretation. Specifically, RC 4 is designed to be a more precise measure of antisocial behavior. Reportedly, Scale 4 (Pd) includes other problem areas such as demoralization and alienation, whereas RC 4 is designed to focus more closely on Antisocial Behavior. However, although this scale is reported to isolate antisocial behavior, this more specific focus did not increase the magnitude of the correlation enough to reach statistical significance. Although it seems intuitive that scales measuring aspects of antisocial behavior would be significantly correlated with temporal discounting, it should be noted that neither scale proposes to specifically measure impulsivity.

Hypothesis 3 predicted a correlation between Scale 9 (Ma) of the MMPI-2 and the temporal discounting measure. This hypothesis was not supported. Reported characteristics of high scorers on Scale 9 (Ma) include people who may get in trouble with the law, often do not see projects through to completion, tend to become easily bored and restless, and have difficulty inhibiting impulses (Graham, 2000). In literature, these characteristics are similar to behavioral descriptions of individuals who discount monetary rewards quickly. Specifically, one symptom of mania cited in the DSM-IV-TR (2000) is reckless spending. However, discounting of monetary values represented in the temporal discounting measure probably represents a different facet of impulsivity. Clearly, in the case of mania, one may be prone to impulsive spending. However, on the measure of temporal discounting, one is asked essentially how long they will wait for

certain amounts of money. This may represent a difference between having money at one's disposal and waiting for hypothetical amounts of money—possibly different facets of impulsivity.

Notably, some research suggests that moderate elevations on scale 9 (Ma) may reflect a somewhat adaptive, heightened energy level rather than impulsivity or an inability to concentrate. Possibly, in the data set, high scores indicating problems with impulse control are balanced out by moderate elevations which may represent an adaptive, heightened energy level (Tellegen et al., 2003).

Hypothesis 4 predicted a correlation between Scale RC 9 (Hypomanic Activation) of the MMPI-2 and the temporal discounting measure. This hypothesis was not supported. Individuals scoring high on RC 9 are similar to individuals scoring high on Scale 9 (Ma). Notably, Tellegen et al. (2003) state that those scoring high on RC 9 often "report a variety of hypomanic symptoms, including a grandiose self-view, general excitation, tendencies toward sensation-seeking and risk taking, poor impulse control, euphoria, decreased need for sleep, racing thoughts and aggression" (p. 57). As in the case of clinical Scale 9 (Ma), RC 9 may be measuring different facets of impulsive behavior. In addition, some research has suggested the same interpretation of moderately elevated scores on RC 9. Specifically, moderately elevated scores may reflected an adaptive, heightened energy level, rather than impulsivity or lack of concentration.

Gerbing et al. (1987) noted the lack of research on the concurrence of behavioral and personality measures. In addition, prior to this study, no research has been conducted on the relationship between scales of the MMPI-2 and behavioral laboratory measures of temporal discounting. Hence, although *a priori* hypotheses proposed for this study were

based on individual studies describing the MMPI-2 and temporal discounting, no research has directly compared these measures and therefore could not guide the formation of hypotheses regarding possible correlations between measures. In other words, the exploratory nature of this study may have contributed to the lack of support for Hypotheses 1 through 4.

Associated Findings

Throughout research literature, temporal discounting has been used as a measure in substance abusing populations. Particularly, in several studies, temporal discounting has differentiated individuals based on their typical consumption of substances (Coffey et al., 2003; Kollins, 2002; Madden et al., 1997; Vuchinich & Simpson, 1998). The current study yielded similar results. Consistent with previous research, a correlation emerged between the number of drugs used in the past 30 days and the area under the curve "parameter" in the measure of temporal discounting. In other words, the more drugs used in the past 30 days, the more quickly participants discounted hypothetical amounts of money. However, two other comparisons did not reveal significant differences, and therefore differed from previous temporal discounting research. Specifically, no significant differences in temporal discounting scores were found between smokers and non-smokers. In addition, no significant differences were found between drug users and non-drug users. Even so, it should be noted that the number of individuals used in these comparisons was relatively small. Specifically, only 10 people reported smoking, and 33 reported previously using drugs.

General Conclusions

Disagreement exists in psychological literature regarding whether certain behavioral tendencies can best be understood in terms of enduring personality characteristics or situation-specific behavioral traits (Mischel & Shoda, 1998). Impulsivity constitutes part of this disagreement. Specifically, Rachlin and Green (1972) define impulsivity behaviorally as choosing smaller immediate rewards over larger delayed rewards. In other research, impulsivity is defined as a personality trait underlying certain behaviors (Tcheremissine, Lane, Cherek, & Pietras, 2003). Though this study has limitations and is small compared to the vast amount of personality research, lack of correlation between the temporal discounting measure (behavioral) and clinical scales on the MMPI-2 (personality) may support the idea that certain behaviors may reflect a "state" rather than an underlying personality "trait."

It is also important to note that impulsivity as a specific term is defined differently throughout research literature. Indeed impulsivity may reflect a "state" rather than a "trait," but this becomes a useless point if there is no consensus on a precise definition of impulsivity. Other researchers have expressed similar frustrations. Specifically, when examining measures of impulsivity, Gerbing et al. (1987) state "the disparity of items within this domain attests to the lack of a coherent framework from which to conceptualize impulsivity" (p. 357). This disparity may have contributed to the lack of support for Hypotheses 1 through 4.

Research regarding correlations between behavioral and personality measures is mixed. Some studies have found moderate correlations between self-report measures of impulsivity and temporal discounting (Madden et al., 1997; Richards, Zhang, Mitchell, &

de Wit, 1999). Other studies have found no correlations between self-report measures of impulsivity and temporal discounting (Coffey et al., 2003; Crean et al., 2000; Vuchnich & Simpson, 1998). It should be noted, however, that the MMPI-2 represents a different approach to identifying personality and behavioral correlates of impulsivity than do other measures. Specifically, the MMPI-2 was created with the empirical keying approach, meaning that items which compose certain scales are not chosen simply because of face validity. Hence, this study represents a different approach from those attempting to correlate "face valid" measures of impulsivity with temporal discounting. This different approach may also have contributed to lack of support for Hypotheses 1 through 4.

Limitations

One primary limitation of this study includes the population from which this sample was drawn. Participants were selected from a mid-sized university in the Mid-west. Likely, some characteristics of this sample represent the geographic location. In addition, the sample had a mean age of 21.41, which is not representative of the general population. Similarly, demographic characteristics of the sample are not representative of the larger population.

Furthermore, research conducted on the MMPI-2 and temporal discounting generally focuses on psychiatric or substance abusing populations. The population from which this sample was drawn consisted of a generally high functioning sample of college students. Although the MMPI-2 can certainly be used to describe "normal" personality characteristics, this is not the instrument's primary function. Hence, results may have been different if the sample was drawn from a clinical population. Likely, there would be more variance in scores if these data were drawn from both populations.

Another limitation includes the reading ability of some students participating in the study. Completion of the MMPI-2 and temporal discounting measure requires at least an eighth grade reading level. This is specified in the informed consent document which participants are required to sign before participating. Even so, there would be logistical and ethical problems related to "screening out" individuals with poor reading ability prior to the study.

Directions for Future Research

This study focused on comparing a measure of temporal discounting to the clinical and restructured clinical scales of the MMPI-2. To use all other MMPI-2 scales would have been cumbersome and beyond the scope of this research. In addition, due to the exploratory nature of this study, analysis was conducted on the scales most frequently used in clinical settings (clinical scales). Analysis was also conducted on the restructured clinical scales because it is projected that these scales will become widely utilized in clinical settings. Furthermore, there is a call in research to explore the validity of these scales.

Notably, measures of temporal discounting have gained support in studies of substance abusing populations. While elements of substance abuse are reflected in certain clinical and restructured clinical scales, no specific measure of substance abuse exists within these scales. However, specific measures of substance abuse exist within other MMPI-2 scales. In future research, these scales could be compared to temporal discounting. Specific scales that could be examined in future research include the MacAndrew Alcoholism Scale—Revised (MAC-R), the Addiction Ackowledgement Scale (AAS), and the Addiction Potential Scale (APS). It should be noted, however, that

MMPI-2 profiles with elevations on Scales 4 and 9 correlate with these substance abuse scales. Hence, the lack of significant correlations between the aforementioned scales and the temporal discounting measure indicate that it may be unlikely that correlations will exist between temporal discounting and similar supplemental scales.

Literature still calls for an examination of the concurrence of behavioral and personality measures (Gerbing et al., 1987). More broadly, there is a need to better understand the relative contributions of "states" and "traits" in human behavior, particularly maladaptive behavior (Mischel & Shoda, 1998). Future studies that focus on bridging these gaps will be well received in personality research.

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APPENDIX A

Informed Consent Document

INFORMED CONSENT DOCUMENT

Personality and Decision Making

Read this consent form and the experimenter reads it aloud. If you have any questions, ask the experimenter, and she will assist you.

The Department of Psychology and Special Education at Emporia State University supports the practice of protection for human participants participating in research and related activities. The following information is provided so that even if you agree to participate, you are free to withdraw at any time, and that if you do withdraw from the study, you will not be subjected to reprimand or any other form of reproach.

In order to explore the relationships between measures of personality and decision-making, you are being asked to complete these questionnaires. It is estimated that it will take you about 2 hours to complete these questionnaires. Completion of these questionnaires requires at least an 8th grade reading level. These questionnaires will be completed anonymously. Your privacy and anonymity will be maintained at all times, in accordance with APA guidelines. No test results will be provided to you individually. Upon completion of this thesis, information about the general results of this study will be available in the psychology department office. It is anticipated that no harm will occur to you during this experiment.

"I have read the above statement and have been fully advised of the procedures to be used in this project. I have been given sufficient opportunity to ask any questions I had concerning the procedures and possible risks involved. I understand the potential risks involved and I assume them voluntarily. I likewise understand that I can withdraw from the study at any time without being subjected to reproach."

_____ _____

Subject Date

APPENDIX B

Demographic Questionnaire

Please answer all questions honestly. Your responses will be kept strictly confidential.

Demographics

1. Male Female

2. Age _____

3. School Classification
   a. Freshman
   b. Sophomore
   c. Junior
   d. Senior

4. Race/Ethnicity

   a. Caucasian
   b. Latino(a)/Hispanic
   c. African American
   d. Asian American/Pacific Islander
   e. American Indian/Alaska Native
   f. Other_____

5. Do you smoke cigarettes daily? If so, how many per day _____

6. During the past 30 days, how many days did you drink alcoholic beverages? _____

7. On the days when you drank, about how many drinks did you drink on the average?
*Note: One drink = 12 oz. beer or 4-5 oz. wine or 1-1.5 oz liquor.

   Number of drinks _____

8. About how many drinks per week do you usually have? _____

9. How many times during the past month did you have 5 or more drinks in one occasion?

   Number of times _____

10. Have you ever used drugs for non-medical purposes (i.e. out of curiosity or to "get high)

   a. Yes
   b. No

11. During the past 30 days, how many days have you used drugs for non-medical purposes? _____

12. Have you ever undergone a psychological evaluation?

    a. Yes
    b. No

13. Have you ever received treatment for a psychological problem of any kind?

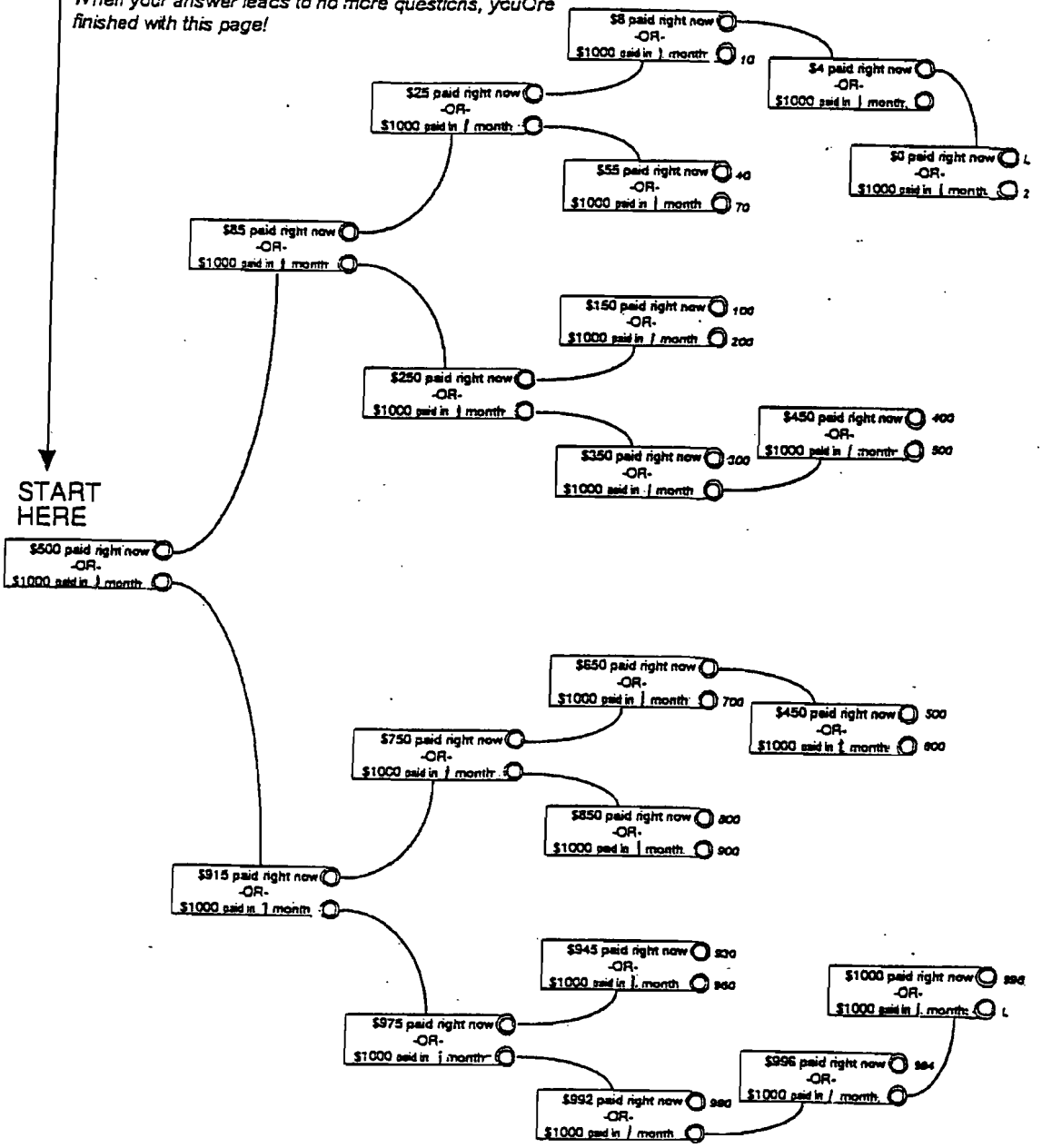
    a. Yes
    b. No

APPENDIX C

Temporal Discounting Measure

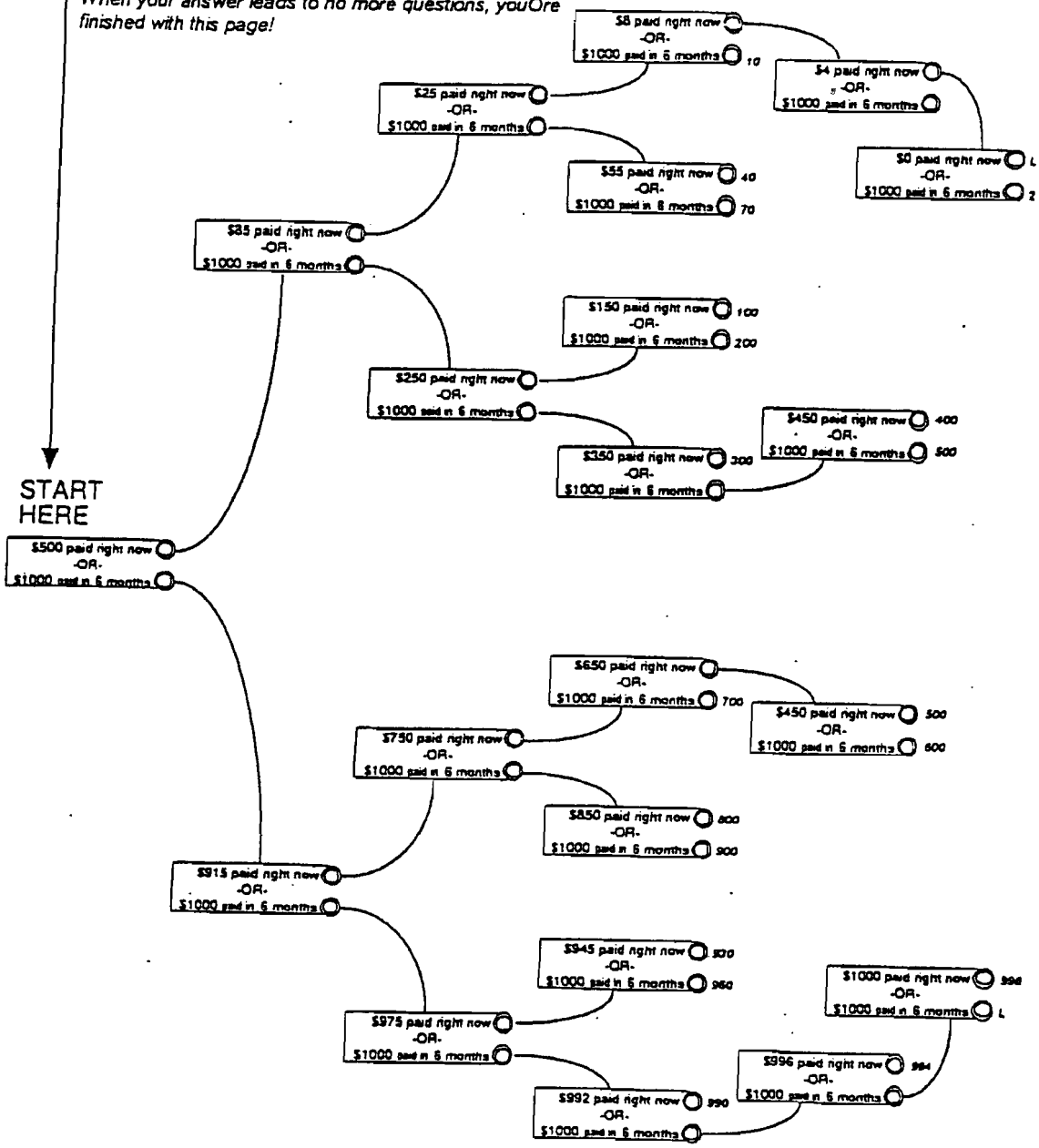
Which would you rather have?

In each box, blacken in the circle beside the money option that you would prefer. Then follow the line that leads from from your answer to the next question. When your answer leads to no more questions, you're finished with this page!



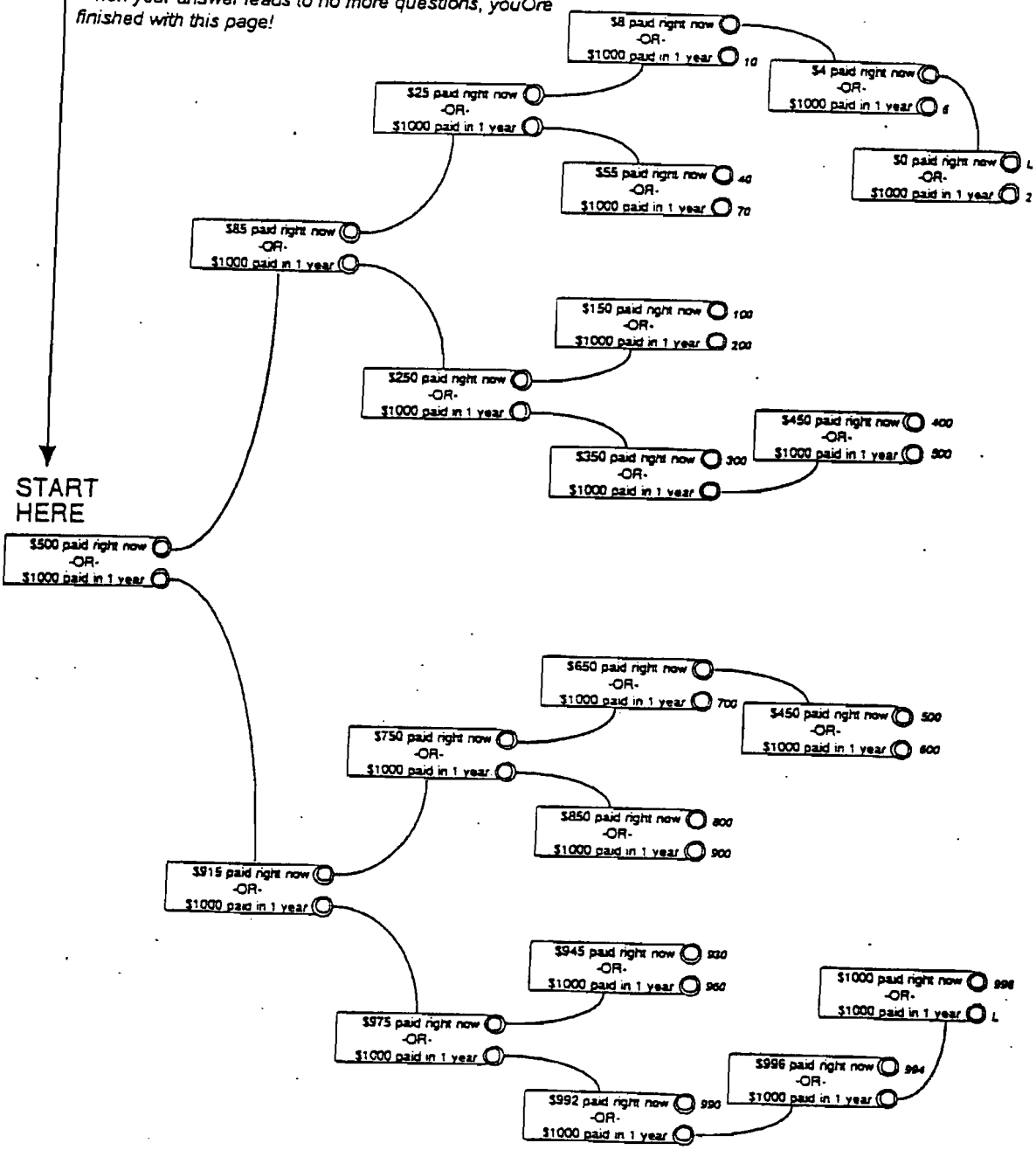
Which would you rather have?

In each box, blacken in the circle beside the money option that you would prefer. Then follow the line that leads from from your answer to the next question. When your answer leads to no more questions, youÕre finished with this page!



Which would you rather have?

In each box, blacken in the circle beside the money option that you would prefer. Then follow the line that leads from from your answer to the next question. When your answer leads to no more questions, youÕre finished with this page!



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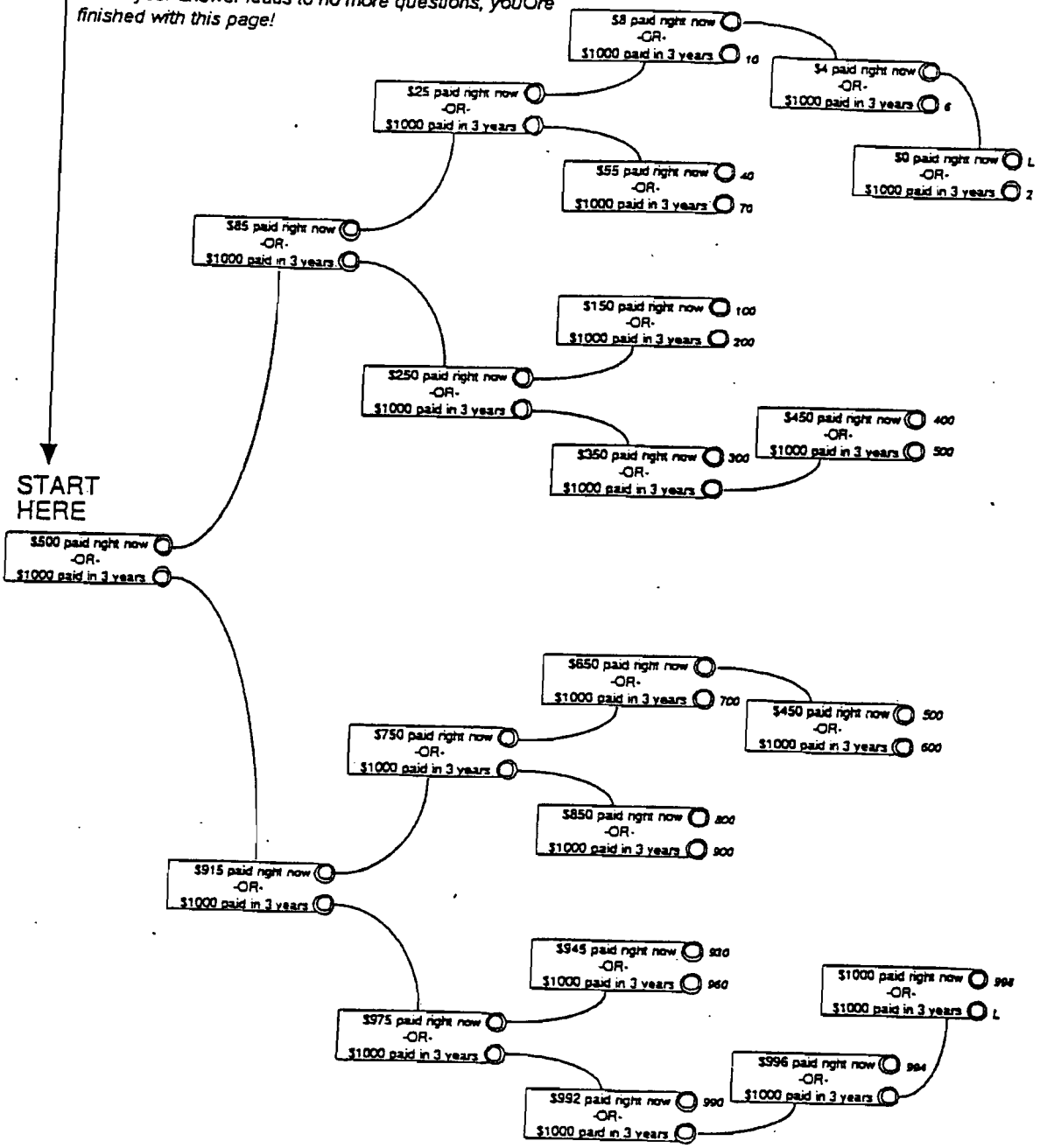

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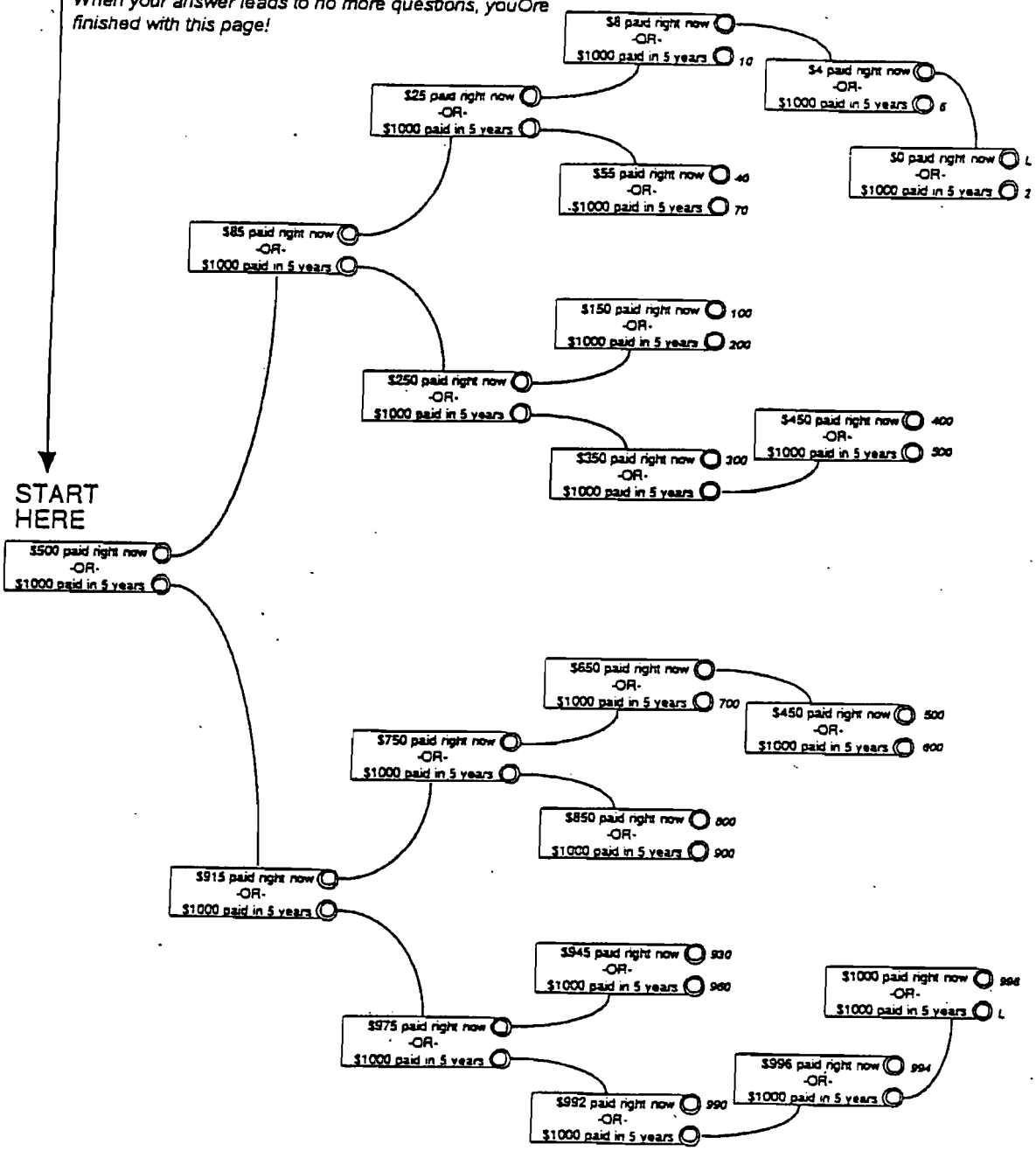

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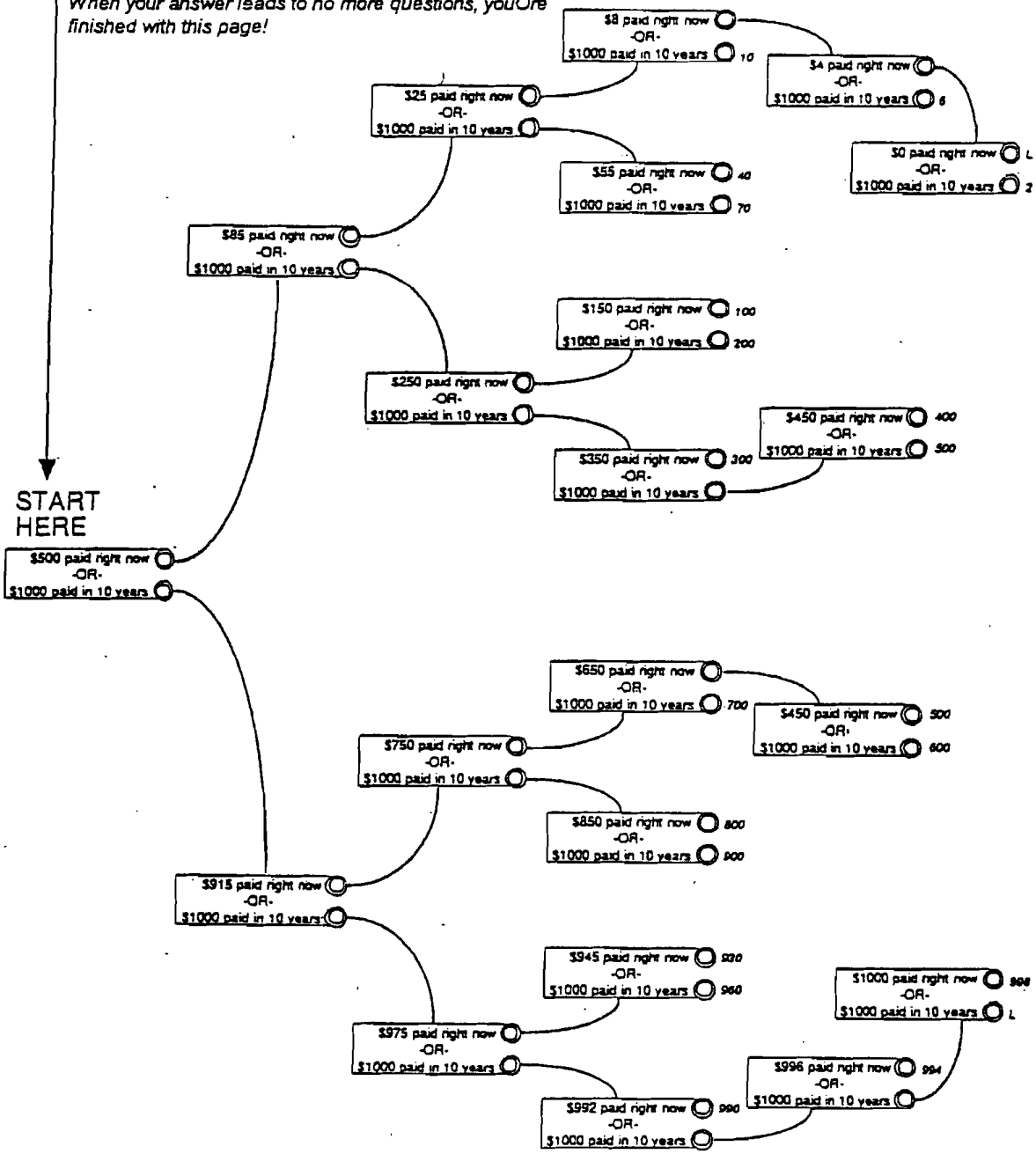

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