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The relationship between time estimation and an individual's ability to delay gratification

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THE RELATIONSHIP BETWEEN TIME ESTIMATION AND AN INDIVIDUAL'S
ABILITY TO DELAY GRATIFICATION

A Thesis

Presented To

Eastern Washington University

Cheney, Washington

In Partial Fulfillment of the Requirements

For the Degree

Master of Science in Psychology: Clinical Emphasis

By

Erin Kamien

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MASTER'S THESIS

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Abstract

This study examines the relationship between an individual's ability to accurately estimate the passage of time and his or her ability to delay gratification. In this study, undergraduate students were asked to estimate time intervals using a time estimation computer program and to provide a verbal estimation of time intervals. These scores were then correlated with delay of gratification measures, designated by their score on a delay of gratification inventory, and their decision to receive extra credit points immediately and end their participation, or to return and collect an additional half of their reward a day later. It was expected that there would be a positive correlation between time estimation and delay of gratification and that there would be a positive correlation between time estimation measures and between delay of gratification measures. The findings of this study were not consistent with the expected outcome, but assist in guiding the direction of future research concerning perception of time and factors influencing decision-making processes.

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The Relationship between Time Estimation and An Individual's Ability to Delay Gratification

It has often been wondered if the passage of time can feel different for individuals depending on their perceptions and characteristics. A possible important factor related to time is patience. One way to define patience is an individual's ability to delay gratification. The ability to correctly assess amounts of time is an important survival skill and a fundamental ability we use every day. We estimate the length of time intervals in many situations daily, from gauging when to speak, to how fast we expect technology to perform, to deciding when to pull out into traffic. Time becomes especially relevant when waiting for a reward or desirable outcome (Filer & Meals, 1949). The ability to delay gratification does not appear to be perceived as having equal importance in modern Western culture as in other cultures, or as it might have in the past. From the fast food industry to credit cards, we are encouraged to live in the present with less regard for the future. Purchasing items on credit, while useful in some cases, has led many individuals to delay financial responsibilities resulting in bankruptcy. It is possible that the amount of time a person perceives to pass while they are waiting for what they want is related to their general ability to wait for it patiently. For example, it is reasonable to assume that some criminals may commit a crime because of a desire they want fulfilled. Perhaps they lose patience and cannot wait for the reward because they are estimating time as flowing slower until something desirable can be obtained. This might also explain a scenario in which two individuals are waiting in line and one may estimate time moving slower and become frustrated, as opposed to the other individual who may estimate time accurately and maintain patience longer.

The purpose of this study is to determine if there is a connection between an individual's ability to accurately estimate how much time has elapsed and the degree of patience they demonstrate for a delayed reward. Insight into the relationship between these variables could further our understanding of social behavior and the process of decision making, such as in the case of irresponsible spending or theft.

In order to examine time estimation and the delay of gratification, it is important to understand how these topics have been studied in the past, both separately and together. In this study, the first variable, time estimation, refers to an individual's ability to accurately estimate how much time has elapsed. The ability to gauge how long an activity will take (duration timing) is a skill we use to function in our environment (Zakay & Block, 1997). It also helps individuals decide if a task is taking too long, leading them to discontinue what they are doing (Zakay & Block, 1997).

Time Estimation

There are several methods used to measure time estimation. One is to have the participant complete a task, and afterwards, estimate how much time was spent working (Zakay & Block, 1997). Another method is to expose the participant to an interval of time and request that he or she attempt to reproduce the interval (Zakay & Block, 1997). Lastly, time can be measured by asking the person to produce a specific interval of time without being exposed to it beforehand (Zakay & Block, 1997). These tasks measure different aspects of cognition and may utilize different cognitive resources (as cited in Zakay & Block, 1997).

Additionally, there are two types of time estimation procedures: a prospective paradigm, where the individual knows they will have to reproduce or estimate the sample

time interval and a retrospective paradigm, where they are not given this advantage (Zakay & Block, 1997). The prospective paradigm utilizes an individual's ability to attend to information while the retrospective paradigm draws on the person's ability to remember what has occurred (Carmeci, Misuraca, & Cardaci, 2009). For the purpose of this study, perception of time will be measured by the ability to attend to time and to remember the passage of time. Therefore, this study will assess both prospective and retrospective time estimation.

Different methods have been developed to measure time estimation based on our current theories of how the human mind perceives time. The biological clock model suggests that our bodies keep time internally (Zakay & Block, 1997). Part of this theory is that our biological clock is affected by our body temperature, as well as our metabolism and level of arousal (Block, Zakay & Hancock, 1998; Zakay & Block, 1997). Cognitive models for time estimation focus on attention and memory (Zakay & Block, 1997). This is specifically related to theories involving prospective and retrospective time estimation (Zakay & Block, 1997). It has been argued that prospective estimation is a matter of attention, while retrospective estimation is based in memory functions (Carmeci, Misuraca, & Cardaci, 2009). The attentional gate model is a model that combines cognitive processes and our internal ability to attend to time (Zakay & Block, 1997). To explain briefly, this model involves a stimulus opening the attentional gate, a pulse building up, an external cue that the duration is completed, and the information being transferred to memory (Zakay & Block, 1997). In prospective estimation, theoretically, a person will be more accurate in estimating time if they attend to the situation, allowing a greater buildup of these pulses (Zakay & Block, 1997).

Delay of Gratification

The concept of delayed gratification has also been examined many ways in past research. It refers to the behavior of delaying a reward and waiting to receive a better reward at a later time (Mischel & Gilligan, 1964). Barkley, Edwards, Laneri, Fletcher, and Metevia (2001) equated delay of gratification with impulsivity, and described impulsivity with the term temporal discounting. An important concept closely related to the ability to delay gratification is the ability to make decisions benefiting an individual on a long-term basis (Gottdiener, Murawski, & Kucharski, 2008).

A classic example of a delayed gratification study is Walter Mischel's 1968 experiment involving children and marshmallows (Colker, 2010). In this study, individual children were given the option of receiving one marshmallow immediately, or two after a period of time (Colker, 2010). Later, Mischel observed these children in adolescence and found that those who elected to delay gratification in his previous study showed a greater degree of control and fewer behavioral problems than those who did not wait for the larger reward (Colker, 2010). Miller and Karniol (1976) conducted a similar study in which they discovered that children estimated the amount of time they were left alone with the reward to be longer when the reward was visible to them.

When working with children, a common reward is candy. Other methods that may be more useful with adults include presenting them with a list of rewards, usually small rewards available now and larger ones that require patience, and allowing the participant to choose which ones they would prefer (Wormith & Hasenpusch, 1979). In another study by Mischel and Gilligan (1964), young boys were put in a situation where it would be more rewarding for them to cheat than to be honest. In this case, the reward was a

badge that displayed their level of proficiency at a game (Mischel & Gilligan, 1964). The boys played a shooting game designed so that it was impossible to obtain the best reward, an expert badge, without lying about their score (Mischel & Gilligan, 1964). This was then correlated with the child's score on a delay of gratification exercise where each child was asked to choose between a series of smaller immediate rewards or a larger reward later (Mischel & Gilligan, 1964). It was found that the children who chose the immediate rewards were more likely to cheat in the game (Mischel & Gilligan, 1964).

What individuals are doing while they attempt to delay a reward has also been found to be an important factor (Peake, Hebl, & Mischel, 2002). In a study conducted with preschool children, it was found that children who were occupied with other tasks waited longer for a reward than those who focused on the reward while waiting (Peake et al., 2002).

These studies suggest that individuals who lack the ability to delay gratification are more susceptible to temptations. However, not all impatient people will cheat or engage in socially undesirable behavior to meet their immediate needs. It is possible there is something more that occurs during the time interval when they are waiting for the enticing reward.

Time Estimation and Delay of Gratification

Previous studies have found connections between time estimation and delayed gratification. For example, Mischel (1961) conducted a study using child participants to examine the links between time estimation and delay of gratification, but included an element of social responsibility. It was found that children who decided to delay a reward

in all of the trials were more accurate in their time estimations and scored higher in social responsibility than children who repeatedly selected the immediate rewards.

Furthermore, research in the late 1950s by Davids and Falkof (1975) reported that a group of younger juvenile delinquents were more accurate in estimating time than older juvenile delinquents. However, the older juvenile delinquents, when asked what they would do with several theoretical quantities of money, showed greater ability to delay gratification, by choosing to save the money, than the younger delinquents (Davids & Falkof, 1975). Similar results were found in a study asking children to pick between receiving five pennies now or ten pennies the next day (Rozek, Wessman, & Gorman, 1977). Younger children took the five pennies, while a greater number of the older children waited for the larger reward of ten (Rozek, Wessman, & Gorman, 1977). However, in this 1977 study, the younger children were less accurate in their predictions of the length of time intervals than the older children (Rozek, Wessman, & Gorman, 1977). The discrepancies between these findings are perplexing, as it would be expected that both skills would improve to a certain point with age and mental development. To eliminate this variable, it appears that an adult population may be more suitable for further research. Additionally, a later study by Davids and Falkof in 1974 with a different group of juvenile delinquents, found that the group in 1959 showed a greater ability to delay gratification, suggesting a difference between generations (Davids & Falkof, 1975). Davids and Falkof (1975) also noted through their measures that the 1974 group showed less concern for others compared to the 1959 group. When asked what they would do with a large sum of money several of the 1959 participants indicated that they would

purchase a gift for someone or give the money to their mother, whereas the 1974 group did not (Davids & Falkof, 1975).

However, few studies have been conducted investigating the link between delay of gratification and time estimation accuracy. In one such study, Filer and Meals (1949) noted that if a person wants something, time appears to slow down resulting in the perception that it takes longer to achieve it. Specifically, the Filer and Meals (1949) study conducted a retrospective paradigm study using college students during which participants were placed in a situation where they would be expected to desire time to pass faster (receiving gratification by leaving class early or obtaining a prize) and gave them a writing task. Several minutes after beginning the task, they were asked to estimate how long they had been working. The groups motivated to want time to move faster reported more time had elapsed than was reported by the control group.

Research has been done in the past to look at factors influencing both time estimation and delayed gratification; however, this study takes a different approach, measuring the variables through a different design, using multiple methods of measurement. Also, past research combining the ideas of delay of gratification and time estimation is limited and has been done primarily with children conducted in the 1950s, 1960s, and 1970s. This study seeks to add to this body of knowledge using adult participants and different means of measuring both variables in an effort to produce more updated results than past studies for an adult population. In this study, participants will be required to estimate how much time has passed, in both a prospective task and a retrospective task. Additionally, the participants will complete a survey and participate in an activity to measure their tendency to delay gratification. It is predicted that an

individual's ability to delay gratification will be positively correlated to time estimation accuracy. Specifically, it is expected that prospective and retrospective time estimation tasks will be positively correlated with delay of gratification survey scores and with a behavioral measure of delay of gratification.

Method

Participants

Forty-seven undergraduate students from two college campuses participated in this study. Of these individuals 33 identified as female and 12 as male. Reported ages of participants ranged from 18 to 53 years old ($M = 26.41$). All participants were compensated with extra credit points for time spent participating in the study.

Materials

Materials remained the same between each campus excepting the computer used to present the time estimation prospective stimulus. Both computers used were laptop devices with similar visual output. The prospective time estimation task was conducted with the SuperLab Pro Beta (1999) computer program. Numbers were displayed in black 64 pt Times New Roman font on a white background. Participants were also given a 12 item delay of gratification survey adapted by Witt (1990) from a study by Ray and Najman (1986). Each survey item is rated with a five point likert scale, in which one designates as "never," three as "neutral," and five as "always." Participants were asked to circle the number to the right of each question to indicate their answer to each question. Survey items include statements such as "Did you tend to save your money as a child?" and "Do you often find it is worthwhile to wait and think things over before deciding?" A higher total score indicates a greater propensity to delay gratification. Items four, five,

six, seven, nine, and ten were reverse scored. An electronic timer was used to measure the time participants spent working on the delay of gratification survey.

Design

This study incorporates four variables: time estimation prospective, time estimation retrospective, delay of gratification scale and delay of gratification behavioral measure. Each participant was exposed to all four tests to assess for a significant correlation between delay of gratification and time estimation. Statistical analyses were performed between these four variables. Analysis of the relationship between the prospective and retrospective scores, as well as between the delay of gratification scale and behavioral measure, were used to assess reliability between similar measures.

Procedure

After signing the informed consent page, participants were given the delay of gratification survey. The researcher began timing with an electronic timer when the participant picked up the pencil to fill out the survey. Each participant then individually completed the delayed gratification inventory. The researcher stopped the electronic timer when the participant indicated they had completed the survey. Participants were then asked to estimate exactly how long they had spent working on the survey in minutes and seconds and were asked to write the amount of elapsed time in the box printed at the bottom of the survey. The researcher then recorded the actual time on the participant's survey sheet. The difference between these two estimates served as the measure of retrospective time estimation.

Next, the participants were informed that they would be asked to estimate intervals of time for the prospective time estimation measurement. Using SuperLab Pro

Beta Version Experimental Lab Software (1999), the participant was shown random numbers from one to nine presented on a computer monitor. The numbers changed randomly every few seconds on the screen until the time interval was completed. Participants were asked to watch the numbers presented in each set and say the numbers out loud. The test began with three practice trials to familiarize the participant with the task. They were then exposed to sets of random numbers appearing on the screen lasting for four different intervals of time measured in seconds: 10, 25, 45, and 60, presented four times each in a random, non-sequential order. In one trial a participant may see numbers appear on the screen and read them aloud for 45 seconds and in the next trial only see and read aloud numbers for 10 seconds. The beginning of the trial was designated by the question “Ready?” appearing on the screen. The trial began after participants indicated they were ready to proceed. The end of each trial was designated by the question “How many seconds did that trial take?” appearing on the screen. All participants viewed the same order of practice intervals and 16 trial intervals. After exposure to each time interval, participants were asked to verbally indicate the length of the duration. These estimates were recorded by the researcher. Participants were not advised of how close their estimates were to the actual time interval to eliminate learning effects.

When this activity was completed, the participant was given the option to receive extra credit for time spent participating and end their participation in the study, or to return the following school day and collect an additional half of the credit earned. The behavioral measure of delay of gratification was designated by whether the participant returned the following day or did not return. Participants were given a debriefing form to

explain the nature of the study when they indicated they would not like to return for the behavioral measure or when they returned to collect their additional credit.

Results

Retrospective Time Estimation

An Independent Samples *t*-test was used to evaluate differences in retrospective time estimation accuracy between individuals that delayed gratification by choosing to receive extra credit and those that did not. Those who chose to delay gratification in the behavioral measure overall tended to make estimates, measured in seconds, closer to their actual time spent on the survey ($M = 75.04$, $SD = 53.22$) than those who did not ($M = 91.45$, $SD = 91.14$). However, results of the *t*-test did not reveal significant differences between groups $t(45) = -.39$, $p = .45$, $d = 0.23$. This suggests an individual's behavioral measure of delay of gratification is not an accurate predictor of retrospective time estimation accuracy.

Prospective Time Estimation

The prospective measure of time estimation produced four types of scores: raw scores, absolute discrepancy scores, ratio scores, and coefficient of variance scores. The time estimation raw score reflects the actual responses provided from the test takers. The absolute discrepancy score reports how far the participant's score was from the mean regardless of whether the difference was due to over or underestimation. The ratio score describes the magnitude of the error and the direction of the error. This was computed by dividing the total of each of the four responses for each time interval (10 s, 25 s, 45 s, and 60 s) by four and again by their respective interval. The coefficient of variance scores shows the variability in the participant's answer for the same intervals of time. It provides

insight as to how consistently the participant estimated the same interval of time. This was calculated by multiplying the standard deviation by the mean of the scores for each of the four time intervals. Results of one-way ANOVAs comparing the behavioral measure of delay of gratification and the different measures of prospective time estimation accuracy revealed no significant differences between groups, $F_s < 1.3$. This suggests that the current behavioral measure of delaying gratification was not an accurate predictor of prospective time estimation accuracy.

Supplementary Analysis

To assess the strength of the behavioral variable, the behavioral measure of delay of gratification was used to predict scores on a self-report measure of delay of gratification through an Independent Samples *t*-test. The scores on the standardized measure of delay of gratification were nearly identical between those who chose to delay their reward in the behavioral measure ($M = 43.12, SD = 6.81$) and those who did not ($M = 42.36, SD = 6.51$). Results of the *t*-test did not reveal any significant difference in delay of gratification survey scores $t(45) = -.39, p = .70, d = 0.11$. This suggests the current measure of delay of gratification was not an accurate predictor of scores on a self-report measure of delay of gratification behavior.

Discussion

The purpose of this study was to examine the relationship between time estimation and delay of gratification. Participants completed both a retrospective and prospective time estimation task, a self-report measure of delay of gratification survey, and a behavioral measure of delay of gratification. It was hypothesized that an individual's ability to delay gratification would be positively correlated to time

estimation accuracy. Counter to hypothesis, the present study did not find an individual's choice to delay their reward to be an accurate predictor of retrospective or prospective time estimation.

There are several explanations for these unexpected findings. When reviewing the literature there were discrepancies between the findings of different studies investigating the connection between time estimation and delay of gratification. As previously mentioned, Davids and Falkof (1975) reported younger juvenile delinquents in their study made more accurate time estimations, but older children showed a greater tendency to delay gratification by choosing to save money rather than spend it. Rozek, Wessman, and Gorman (1977) found older children delayed gratification more often and estimated time more accurately. These studies provide conflicting results as to which age group is more accurate in estimating time. It is possible that the difference in these findings may have been due to the experimental designs, the participants, or cultural changes over the years between the experiments by Davids and Falkof in 1959 and in 1974.

In their 1998 study Lennings and Burns also noted discrepancies in the findings of past research involving time estimation and impulsivity, as well as in their own study. In the present study, impulsivity was also believed to be an important factor to an individual's ability to delay gratification. Lennings and Burns (1998) cited research covering a wide array of results, some supporting the idea that time estimation is related to impulsivity, as well as research refuting the idea. Through their review of the relevant literature, they noted many researchers had expected to find a relationship between time estimation and impulsivity, but had failed to do so. In their own study Lennings and Burns (1998) conducted a two part experiment to examine the relationship between time

perspective, time estimation, and impulsivity. In the first part of their study, time perspective was measured with a time perspective questionnaire, time estimation was measured by participant estimation of elapsed time while working on the Block Design assessment of the WAIS, and impulsivity was measured using the Schalling Impulsivity Scale. Lennings and Burns (1998) reported they found no significant correlations between impulsivity and their time estimation or perspective variables. In the second part of their study, Lennings and Burns (1998) used a revised version of their time perspective scale, a prospective time estimation task asking participants to indicate when they believed 30 seconds had passed, and an estimation of how long it took to complete the Picture Arrangement section of the WAIS. Through their measures, including a prospective and retrospective time estimation measure, no clear connection was found between time estimation and impulsivity. Lennings and Burns (1998) noted that their study differed from the 1975 study by Davids and Falkoff that found self-control, time estimation, and time perspective were related. Lennings and Burns suggested the difference between these findings could be due to differences in the lengths of time intervals assessed in the different studies.

Alternately, Filer and Meals (1949) reported a connection between time perception and the desire for time to move faster. They found students overestimated how much time had passed when anticipating the reward of leaving class early. If participants had a desire for the experiment to end quickly, it is possible this affected their responses in both time estimation tasks. Past research has also suggested participants tend to overestimate time when experiencing stress (Siegman, 1962). Siegman (1962) conducted a study in which participants were exposed to intervals of 20 and 5 seconds, and

afterwards measured anxiety with a scale and impulse control with a drawing task. It was found that participant scores on an anxiety scale were positively correlated to time estimation scores and negatively correlated with impulse control. Essentially, those who are more anxious may overestimate time and display increased impulsiveness. The findings of Siegman (1962) and those of Filer and Meals (1949) support the idea that the mental state of the participant, such as being anxious or wanting to finish the experiment, could have affected participants in the present study.

Before concluding, limitations to the present study are considered. The largest complexity with this study may have been in the design of the behavioral measure of delay of gratification. Specifically, supplementary findings showed that participants who elected to delay gratification did not score higher on a self-report measure of delay of gratification. That is, the scores on a self-report delay of gratification measure were not statistically different between individuals that opted to return for additional credit and those that did not. It is possible that the reward for delaying gratification may not have been equally meaningful to all participants. Previous research into delay of gratification greatly focused on children and supplied edible treats, such as in Walter Mischel's 1968 marshmallow experiment, or small prizes as rewards (Colker, 2010; Wormith & Hasenpusch, 1979). In the present study for this measure participants were asked to choose to receive credit for time spent participating and end their participation in the study, or return the following day and collect an additional half of their credit earned. As all participants were college students, extra credit was believed to be a desirable reward. To ensure all participants received compensation for their time spent in the study, credit for the first day of participation was not withheld until they returned. Although

withholding the reward until the second day would have been more similar to the original delay of gratification studies by Mischel (1961), it was believed the time interval between participation and reward would be too large. This was especially true for participants who were tested on a Friday and were asked if they would like to return the following school day, with two days in-between to lose interest in participation.

Also, although the researcher kept the reward for delay of gratification consistent for each participant, many students from different courses and two college campuses participated in this study. The variations of instructor policies regarding extra credit and the value to which the credit earned in the study translated to class credit varied between the courses in which participants were enrolled. When offered the opportunity to return and earn additional credit, some participants declined, stating they did not need additional credit. Alternately, several participants indicated they did not need the extra credit but would return if it would be of assistance to the study. This may be of interest when studying delay of gratification from the perspective of social responsibility. Participants discussed many factors which led them to decline or accept the offer to return for additional credit such as how busy they were, their plans for the next day, their grade in the course to which they were applying the extra credit, and their degree of confidence that the additional credit would be worth their effort. Therefore, it is recommended that future studies select a different behavioral measure of delay of gratification suitable to an adult college population.

Statistical analysis showed little correlation between the two measures of time estimation. Also, no correlation was found between delay of gratification measures. If the two measures of the similar trait had been assessing the same quality, theoretically, the

results should have been positively correlated. For example, a participant with a higher score on the delay of gratification scale should have selected to delay gratification in the behavioral measure if both tests were accurately measuring delay of gratification. This indicates there are several areas in the design of this experiment in which there is room for future improvement.

Furthermore, during the study a small number of participants commented that they had been using techniques to allow them to count time during the time estimation prospective task. This included examples such as tapping their toes under the desk or making a strong effort to count numbers in their minds. However, this measure has been used successfully in other studies and all participants had equal opportunity to use these methods.

The delay of gratification scale, adapted from Witt (1990) as originally designed for use by Ray and Najman in 1986, also presented difficulties. During the study, participants asked questions concerning the wording of the questions. For example, in question 10: “Is it hard for you to keep from ‘blowing your top’ when someone gets you very angry?” participants asked for an explanation of “blowing your top.” If this study were to be conducted again, it may be beneficial to alter the wording of some questions to more descriptive terms.

In future, it would be beneficial to fine-tune the delay of gratification measures and further explore traits of those who demonstrate the ability to delay gratification. Ideally this would include a larger group of participants including non-students. It must be considered that students inherently demonstrate some capacity for delayed gratification by choosing to work toward a degree under the assumption they will receive

a better occupation in the future. For consistency during the experiment, and to allow the researcher to withhold a suitable reward, it is recommended that future designs of this study allow the participant to complete their participation within the span of one day.

Although the results of this study were not as expected, they provide direction for future study in this field. If time estimation is not related to one's ability to delay gratification, and by larger extent patience, there may be other important factors that shape decision making and time-related choices. Finding these additional factors will require further exploration into our ability to wait patiently for a reward and the considerations taken into account when determining the benefits of avoiding the immediate reward and waiting for something greater in the future.

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Appendix

Age: _____ Gender: _____

Please circle the number to the right of each question that best describes you.

1. Never 2. Sometimes 3. Neutral 4. Frequently 5. Always

- 1. Are you good at saving your money rather than spending it straight away? 1 2 3 4 5
- 2. Do you enjoy something more because you had to wait for it and plan for it? 1 2 3 4 5
- 3. Did you tend to save your money as a child? 1 2 3 4 5
- 4. When you are in a supermarket do you tend to buy a lot of things you hadn't planned to buy? 1 2 3 4 5
- 5. Are you constantly broke? 1 2 3 4 5
- 6. Do you agree with the philosophy: "Eat, drink and be merry, for tomorrow we may all be dead?" 1 2 3 4 5
- 7. Would you describe yourself as being too impulsive for your own good? 1 2 3 4 5
- 8. Do you often find that it is worthwhile to wait and think things over before deciding? 1 2 3 4 5
- 9. Do you like to spend your money as soon as you get it? 1 2 3 4 5
- 10. Is it hard for you to keep from "blowing your top" when someone gets you very angry? 1 2 3 4 5
- 11. Can you tolerate being kept waiting for things fairly easily most of the time? 1 2 3 4 5
- 12. Are you good at planning things far in advance? 1 2 3 4 5

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VITA

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