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**THE NEUROPSYCHOLOGICAL CORRELATES OF SEVERE ACADEMIC
PROCRASTINATION**

BY

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A DISSERTATION

**Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of**

DOCTOR OF PHILOSOPHY

Department of Counseling Psychology

1999

ABSTRACT

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PROCRASTINATION

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Procrastination is a problem that is prevalent in academic settings. There has been a proliferation of research into this disabling behavior over the last 15 years in particular. The research has run the gamut from studies of a plethora of cognitive, affective, and behavioral correlates. To date, no investigation has considered the possible contribution of neuropsychological variables in procrastination. One problem has been an over reliance on samples of convenience. As a result, the information on procrastination describes typical but not severe procrastinators. Severe procrastinators are those individuals who suffer significant consequences as a result of their procrastination. The present study was designed to be the first to identify a sample of severe procrastinators and then to compare their performance to a control group on variety of measures of neuropsychological functioning.

The subjects were 63 community college students. Thirty-three were on academic probation, and 30 were psychology students in good academic standing. Each subject completed a brief neuropsychological assessment primarily focused on executive functioning abilities. Subjects also completed additional instruments that assessed procrastination, intelligence, depression, and Attention Deficit Disorder.

A significant mean difference was obtained on the procrastination scale confirming that the students on academic probation experience severe academic procrastination. Further comparisons of means as well as correlational analyses failed to support a relationship between executive functioning and procrastination. The only significant difference on a neuropsychological measure was on the Ruff Figural Fluency Test with the severe procrastinators performing much poorer. These results are discussed in the context of the difficulties in assessing executive functioning ability and sampling bias. Implications and suggestions for future research are discussed.

DEDICATION

To my daughter, Natalie, without whom this project surely would not have come to completion. It is my hope someday she will understand the importance of this accomplishment and know that for her as well, anything is possible.

ACKNOWLEDGEMENTS

The author expresses sincere appreciation to Dr. Nancy Crewe for not only paving the way for my entry into the program but for her patience and support throughout the arduous process. Thanks to Joni Smith for being my conduit to the program when I was so far away. A special thanks goes out to Dr. Robert Johnstone and Christy Wells for their input and patience. There are also numerous people for whom I am eternally grateful to for their encouragement, patience, and never ending belief that I could finish despite my own doubts. So I say thank you from the bottom of my heart to Dr. Bernie Schwartz, Mark Gordon, Dr. Lauren Harris, Dr. Matthew Keene, Dr. Leslie Dana-Kirby, Jennifer Thomas, Dr. Lisa Crandell, Harry Stone, and the gorilla.

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CHAPTER I

INTRODUCTION

Procrastination, the act of putting off until tomorrow what could be done today, is familiar to all of us. The subject of innumerable self-effacing jokes, it is impossible to estimate the total human cost of procrastination in terms of lack of productivity and suffering. A cursory search of the Internet yields 3,280 websites that contain some reference to procrastination. Universities have posted self-help quizzes to help students recognize whether or not a procrastination problem exists in addition to advice on overcoming the problem. Business consulting firms have posted a myriad of information about the enormous cost of wasting a business's most valuable commodity – their employee's productivity. The most frequently appearing type of website has been posted by students who have constructed a home page apparently to avoid what they acknowledged they should be doing.

For years in the popular literature, various self-help books have appeared in bookstores across the country (Porat, 1980; Knaus, 1979; Lakein, 1973; Ellis & Knaus, 1977) addressing procrastination. The authors, usually clinicians, offer various non-empirical explanations for procrastination as well as numerous approaches to remediate it. In academic settings it is estimated that the percent of college students who procrastinate range from as low as 22% - 33% (Ely & Hampton, 1973; Rosati, 1975) to as high as 95% (Ellis and Knaus, 1977). Given this prevalence of procrastination, it is surprising that procrastination has moved out of the popular psychology literature and begun receiving serious empirical attention only over the last 20 years.

To date, the predominant empirical approach to investigating procrastination has focused on correlating this often crippling behavior with a myriad of psychological, cognitive, and personality factors including self-regulation (Senecal, Koestner, and Vallerand, 1995), perfectionism (Ferrari, 1992, Flett et al., 1992), low self-esteem (Effert & Ferrari, 1989), fear of failure (Solomon & Rothblum, 1984), learned helplessness (McKean, 1994a), low self-efficacy (Haycock et al., 1998), irrational beliefs (Bridges and Roig, 1997) among others. There is also a growing clinical literature that posit various psychodynamic explanations of procrastination including death anxiety (Donovan, 1995), fear of success (Rorer, 1983), and being in an impasse during psychodynamic treatment (Giovacchini, 1975).

To date, no investigation has considered the potential role of neuropsychological variables in procrastination. It has long been an implicit bias of the social sciences to seek psychological explanations (e.g., low self-esteem) for the phenomena they study e.g. depression. This bias is also covertly expressed in clinical practice. How often do clinical or counseling psychologists require a full physical examination for their new clients? It may not even occur to them to request one. The assumption is either that the biological system is intact or that such variables are not very relevant to psychological treatment. This is in contrast to the physical sciences, which historically seek tangible or material explanations for the phenomena they study. While each discipline's assumptions regarding causality have merit, Wicker (1985) reminds us that the human tendency to think recurring thoughts limits our theories and research.

Over the last 10 to 15 years the social sciences have expanded their view of the individual to conceptualize them and their problems from a biopsychosocial perspective.

Ferrari, Johnson, and McCown (1995) in their book on procrastination and task avoidance state, “to date, almost nothing is known about the neuropsychology of procrastination. Theoretically, it is possible that severe chronic procrastinators exhibit subtle neuropsychological deficits related to executive functioning, but currently this remains simply an interesting speculation” (p. 45).

It is the primary purpose of this exploratory study to investigate the neuropsychology of procrastination in an attempt to shed light on whether deficits in executive functioning are related to severe procrastination. From a review of the relevant procrastination literature as well as the literature on executive functioning ability, the question regarding the role of neuropsychological variables in procrastination becomes reasonable. The current study had two objectives. The first objective is to identify a group of “clinical” academic procrastinators. As will be seen, the issues of chronicity and severity have not been given serious consideration when investigating procrastination. There seems to be an implicit bias that procrastination is not a “clinical” condition. The second objective is to determine the relationship, if any, between academic procrastination and several measures of executive functioning. Wicker (1985) encourages researchers to consider alternative, even greatly divergent, perspectives to explain what we believe we already understand. The consideration of neuropsychological variables in procrastination is one such conceptual stretch.

It is felt that an understanding of the relationship between academic procrastination and neuropsychological variables will have significance for counselors, teachers, and researchers. A clearer understanding of neuropsychological variables in procrastination can potentially lead to a process of identifying and intervening with a

large number of students who are currently undetected and who are failing to complete their community college degrees. With the high prevalence of procrastination among college students (cited earlier), it is imperative that counseling psychologists have a better understanding of this disabling behavior.

CHAPTER II
LITERATURE REVIEW

Procrastination

Defined

Procrastination is not a modern problem associated exclusively with industrial societies and their emphasis on schedule adherence, punctuality, and efficiency. Nor has the term always had an implicit negative moral quality about it as typified by such adjectives for procrastinators as unproductive and lazy. According to American Heritage Dictionary (1977), the word “procrastinate” comes from the Latin word *procrastinare*, which means “to put forward until tomorrow.” It is further defined as “putting off something (especially unpleasant or burdensome) until a future time; especially to postpone such actions habitually.” The negative connotation of this definition has not always been the way procrastination has been perceived. Historically, in countries where technology was not yet developed and adherence to was less important, the term procrastination was not associated with descriptions such as lazy, indolent, or unambitious. In an achievement-oriented society, however, such terms are routinely used. Ferrari, Johnson, and McGown (1995) suggest that the Romans used the term to express the notion that “deferring judgement may be necessary and wise, such as when it is best to wait the enemy out and demonstrate patience in military conflict” (p.4).

Phillip Stanhope, the Earl of Chesterfield, in 1749 offered an opinion about procrastination that echoes modern society’s attitude toward procrastination. He stated “no idleness, no laziness, no procrastination; never put off till tomorrow what you can do

today” (Stanhope, 1749 in Bartlett’s Quotations, 1968). Contemporary writers concur in spirit with the notion that procrastination is undesirable. Solomon and Rothblum (1984) defined procrastination as the act of needlessly delaying tasks to the point of experiencing discomfort. Lay (1986) defined it as an irrational tendency to delay tasks that should be completed. In our society, productivity and accomplishing are highly valued norms. According to Haycock, McCarthy, and Skay (1998), procrastinators violate these societal norms by failing to get things done (responsibilities, tasks, or decisions) in a timely manner. They agree with Solomon and Rothblum (1984) that procrastination involves internal, subjective discomfort usually thought to be anxiety. It is this internal discomfort that differentiates procrastination from simply deciding to do an activity later.

Milgram, Gehrman, and Keinan (1992) criticized the definition of procrastination as requiring both behavioral delay and emotional upset on empirical as well as logical grounds. They investigated whether students were performing daily life tasks (chores, appointments) on time and they found only a weak relationship (.13) between behavioral delay and emotional upset. They also found that students who scored high on both behavioral delay and emotional upset reported higher trait anxiety and were more sensitive to negative events than students scoring low on behavioral delay but high on emotional upset. They concluded, “procrastination is in the mind of the performer, not in the eye of the beholder” (p.198). Milgram (1991) offered his own definition of procrastination, which emphasized four components as necessary for a behavior to be considered procrastination: (1) postponing a behavior; (2) this postponement results in substandard performance; (3) the task is considered by the procrastinator as being important to perform; and (4) there is an experience of some level of emotional upset.

On logical grounds this multidimensional definition of procrastination certainly applies to a large percentage of procrastinators but its generalizability is questionable.

Procrastination does not always lead to substandard performance. For many individuals delaying a task is a deliberate motivational strategy. For others, “functional procrastination” (Ferrari and Olivette, 1994) is not self-defeating but rather is in one’s own best interest. For example, it may make sense to avoid paying income tax for as long as possible to allow for maximum return on investment for the funds. As Milgram et al. (1992) just pointed out, not all procrastinators experience significant levels of distress from their dilatory behavior. So it would appear that two years after offering his multidimensional definition, he began to modify it appropriately. It is this writer’s opinion that Milgram, Weizman, and Amiran’s (1991) definition is extremely accurate for individuals whose behavior could be considered to have reached “clinical” proportions. As will be discussed later in this literature review, the issue of severity and chronicity has been sorely missing from the procrastination research.

Another approach to defining procrastination in the literature is the use of operational definitions. This type of definition typically involves behavioral indices or psychometric classifications. A variety of different behavioral measures have been used to define academic procrastination including when assignments are turned in, when a questionnaire is returned, number of self-paced quizzes completed during the last couple of weeks of the semester (Solomon and Rothblum, 1984; Lay, 1986; Miller, Weaver, and Semb, 1974). The second and most common way of operationally defining procrastination is through the use of self-report inventories. Several good inventories have been developed that assess academic procrastination including the Procrastination

Assessment Scale-Students (PASS) (Rothblum, 1984) and the Aitken Procrastination Inventory (API) (Aitken, 1982); decisional procrastination including the Adult Inventory of Procrastination (AIP) (McCown and Johnson, 1989); and procrastination of daily tasks including the General Procrastination Scale (GP) (Lay, 1986). The typical procedure is to administer the inventory and determine “high vs. low” procrastinators using quartile or mean splits. Ferrari, Johnson, and McGown (1995) point out that an advantage of this procedure is that it groups the data, which makes them amendable to hypothesis testing with analysis of variance (ANOVA). A major disadvantage of these self-report inventories is the extremely limited normative samples. Virtually every respectable inventory reviewed by Ferrari et al. (1995) was normed on undergraduate university students. In addition, not a single inventory of academic procrastination contains any normative information about the severity of procrastination. As a result these arbitrary methods of defining procrastination are at best a “stopgap measure” until better instruments are developed. In summary, although there is some disagreement whether experiencing emotional upset is necessary for avoidant behavior to be considered procrastination, there is consensus that procrastination always involves avoidant behavior that typically results in substandard performance.

Prevalence

Someone once said that only two things in life are certain: death and taxes. The evidence suggests that there is at least one more --- procrastination. Aitken (1982), however, observes that if everyone procrastinates at least occasionally, is it even a problem that warrants investigation? The answer, of course, is “yes.” The universality of a condition does in no way diminish its need for investigation. Rather one could argue

that conditions that affect the largest number of people warrant the most investigation. Although Aitken's question clearly was rhetorical, the logic implicit in it would lead us to ignore, for example, tooth decay simply because it is so common. For those individuals who procrastinate only some of the time and in limited areas of their lives, procrastination is most likely not problematic. However, for those individuals who "habitually" procrastinate, especially on important issues or tasks, procrastination can be a severe, chronic, and debilitating problem.

To accurately estimate the prevalence of procrastination, it is useful to separate procrastination rates among student and non-student populations. Most procrastination research has focused on students. They offer very convenient samples of research subjects as well as the functional significance of and consequences of procrastinating on academic tasks (e.g., failing to graduate). As noted earlier, estimates of the percent of college students who procrastinate range from as low as 22%-33% (Ely and Hampton, 1973; Rosati, 1975) to as high as 95% (Ellis and Knaus, 1977). In one of the early surveys of student procrastination, Hill, Hill, Chabot, and Barrall (1978) asked 500 students from five different colleges to rate their procrastination on a five-point scale. Their results showed that 27% of the students rated themselves as procrastinating "usually and frequently." Another 23% rated their procrastination as occurring "about half the time" yielding a total frequency of 50%. Another interesting finding from this study was the frequency of procrastination increased from freshman to senior year.

To study the personality profiles of student procrastinators, Aitken (1982), developed her own self-report procrastination questionnaire. After administering her questionnaire to 120 undergraduate students she found reported frequency of

procrastination similar to what Hill, Hill, Chabot and Barrall (1978) found in their study. Twenty-six percent of her sample reported they frequently procrastinated with an additional 27% procrastinating about half the time.

Solomon and Rothblum (1984) were interested in the frequency of students' procrastination on academic tasks. They surveyed 342 undergraduates on a variety of academic tasks including writing a term paper, studying for exams, and reading weekly assignments. Results indicated that 46% of the subjects reported nearly always procrastinating on writing a term paper, 27% on studying for exams, and 30% procrastinate in keeping up with weekly reading assignments. When the students were asked the degree to which they felt procrastination was a problem for them, 23% reported it was almost always a problem when writing a term paper, 21% when studying for an exam, and 23% when doing reading assignments. An additional important finding of this study was that there were no significant sex differences with regards to the frequency of reported procrastination. This finding is consistent with other findings (Ferrari, 1993; Flett, Blankstein, Hewitt, and Koledin, 1992; Ferrari, 1991; Ferrari, 1992). Rothblum, Solomon, and Murakami (1986), extending the work of Solomon and Rothblum (1984), surveyed 379 university students to investigate cognitive, affective, or behavioral differences between high and low procrastinators. They found that 40% of their subjects reported that they nearly always or always procrastinate on exams to the point of experiencing significant anxiety.

Compared to the numerous studies of the frequency of academic procrastination, only a few studies report the prevalence of procrastination in the general non-student population (Ferrari, Johnson, and McGown, 1995). McGown and Johnson (1989), in

their study validating an inventory for general procrastination tendencies, found that 25% of the 146 adults surveyed reported that procrastination was a “significant problem” in their lives.

Harriot and Ferrari (1996) had 212 adults complete measures of decisional and avoidant procrastination to assess the prevalence of procrastination in the general community. Decisional procrastination (Effert and Ferrari, 1989) is the purposive delay in making decisions within a specified period of time. Avoidant procrastination refers to the delay in completing important activities of daily living e.g. paying bills, scheduling appointments. In this study the overall prevalence of procrastination was 20%. An additional finding, consistent with the research on academic procrastination, was the absence of sex differences. The authors suggested that procrastination might decrease with age since the obtained prevalence rates for older non-student samples are lower than for students. In support of this hypothesis, McCown and Roberts (1994) found from their telephone survey that procrastination did tend to decrease across the lifespan for both sexes with an abrupt increase as individuals entered their sixties.

In summary, the literature consistently found that the prevalence of academic procrastination is estimated to be somewhere between 30% to 50% of college undergraduates. There is also no evidence that sex differences exist with regards to its prevalence. There is also evidence to suggest that ethnicity does not affect the prevalence of academic procrastination. Clark and Oliver (1994) examined academic procrastination with African-American students using the Procrastination Assessment Scale-Students (PASS). Thirty percent of the African-American students reported that they nearly always or always procrastinate on writing a term paper, 28% when studying for exams,

and 35% when keeping up with reading assignments. These percentages are consistent with the ones reported earlier by Solomon and Rothblum (1984) using an exclusively Caucasian sample. The African-American students reported a higher percentage than the Caucasian students with regards to whether procrastination is always or nearly always a problem for them. While procrastination among the general population appears to be somewhat less than for students, the total percentage of individuals who struggle with this problem is staggering. For this reason alone it is surprising that the research has only begun to proliferate in the last 10 years.

Types of Procrastination

The predominant methodology in procrastination research to date has been to choose a type of procrastination (e.g., academic, decisional), administer various self-report inventories, and then report a variety of correlates of procrastination including psychological, cognitive, and personality factors. Such descriptive field approaches to procrastination (Heppner, Kivlighan, & Wampold, 1992) have not been fruitless. The procrastination literature provides clear evidence that these factors are integrally involved for the majority of procrastinators. The following literature review will first address a representative sample of research on decisional procrastination and general procrastination of daily living. This will be followed by a more exhaustive review on the more heuristically rich area of academic procrastination. Finally a critique of the literature will be presented, setting the stage for the issues addressed in this study.

Procrastination of Daily Living. In contrast to academic procrastination, which deals with exclusively academic behaviors, procrastination of daily living (PDL) is less specific and pertains virtually to all tasks that are involved in obtaining personal and

professional goals. The questionnaires that assess the individuals propensity for PDL will inquire about tasks such as paying bills, doing the dishes, punctuality, setting appointments, and returning phone calls, to name just a few. PDL is also referred to in the literature as procrastination of everyday life (Milgram, Sroloff, and Rosenbaum, 1988) and procrastination of daily routines (Milgram, Gehrman, and Keinan, 1992).

In a study in which he developed the General Procrastination Scale (GP), Lay (1986) was interested in examining the “individual and situational correlates of procrastinatory behavior.” In addition to completing the GP, students completed scales assessing neurotic disorganization, organization, energy level, self-esteem, achievement, and desirability. The author also included a behavioral measure that involved the subjects mailing a questionnaire back to the investigator after completing it. Using a median split procedure, high procrastinators tended to score high on neurotic disorganization scale and low on the organization scale. Procrastination scores were unrelated to academic achievement, energy level, and self-esteem.

Milgram, Sroloff, and Rosenbaum (1988) also investigated the procrastination of everyday life. The authors argue that defining exactly what is considered procrastination with routine life tasks is inherently more difficult than defining academic procrastination. Milgram et al. conceptualize procrastination of daily tasks to a trait rather than a state characteristic. Subjects completed a procrastination questionnaire and several personality measures assessing self-regulation, Type A behavior, and life satisfaction. Consistent with other research (Solomon & Rothblum, 1984), procrastination was greater on tasks regarded as unpleasant or impositions. Procrastination was also negatively related to self-regulation, Type A behavior, and life satisfaction.

Milgram, Gehrman, and Keinan (1992), continuing with their programmatic research, investigated the relationship between procrastination and emotional upset. As discussed earlier, there are varying opinions about whether emotional upset is required for a behavior to be considered procrastination rather than just waiting until a later time to perform a task. Subjects in Milgram et al's study were divided into 4 groups along two dimensions: high vs. low procrastinators and high vs. low manifest emotional upset. Two additional personality variables, repressor/sensitizer (R/S) and pessimism, were also assessed because they were hypothesized to be antecedents to procrastination. The R/S variable refers to one's perceptual threshold for a threatening event as well as the degree of approach/avoidance to the event. Sensitizers who are characterized by low threshold for and avoidance of a threatening event are thought to be more likely to procrastinate regarding routines of daily living. Pessimism refers to a cognitive-affective expectancy that things will turn out badly, which in turn leads to avoidant behavior. Level of emotional upset was obtained by having the subjects report how upset they believe they would get over procrastinating on 19 activities of daily living. The authors hoped to develop a typology that delineates the relationship between procrastination and manifest emotional upset. Manifest emotional upset and procrastination of daily events were only mildly correlated while procrastination was unrelated to pessimism and S/R. This supports the argument that not all procrastinators experience high level of emotional upset about their behavior. A factor analysis divided the subjects into 4 different profiles combining the two primary variables in this study (high vs. low procrastination, high vs. low manifest emotional upset). These groups differ in their personality traits. The most interesting finding is that the largest group from the factor analysis consisted of subjects

who were low in procrastination and high in manifest emotional upset. These “prompt” individuals’ level of emotional upset seems to stir them on to avoid procrastination rather than bog them down into behavioral delay. The next largest group of subjects fell into the high level of procrastination and low level of emotional upset further establishing that emotional upset does not appear to be a necessary condition for defining what is considered to be procrastination. These findings indicate that concern about behavioral delay is associated with poorer psychological adjustment in procrastinators and better psychological adjustment in low procrastinators. One obvious problem with this study is that it used subjects who were imagining procrastinatory behavior rather than those individuals who were struggling with this behavior.

Milgram and Naaman (1996) attempted to replicate the findings from the study just reviewed, which had suggested a weak relationship between procrastination of daily tasks and emotional upset or concern. They were also interested in determining whether the same relationship between procrastination and emotional upset applied to academic procrastination. Results indicated that delay and upset about delay were unrelated for both daily life and academic procrastination. As before, the students were assigned to one of four subgroups using median split procedure according to their respective levels of delay and concern. The relationship between expressed emotional upset and procrastination status was replicated with concerned procrastinators reporting poorer adjustment and low procrastinators showing better adjustment. Procrastinators showing low levels of emotional concern were described as having lower levels of aspiration compared to concerned procrastinators.

Ferrari (1992) hypothesizes that perfectionistic tendencies play a moderating role in procrastinatory behavior. Others have also identified perfectionism as being positively related to procrastination (Frost, Marten, Lahart, and Rosenblate, 1990; Ashby, Mangine, and Slaney, 1995; Flett, Blankstein, Hewitt, and Koledin, 1992). Ferrari was primarily interested in whether perfectionistic tendencies were 1) associated with procrastination of daily tasks and 2) whether procrastinators compared to non-procrastinators engaged in perfectionistic tendencies for different reasons. As predicted, procrastinators reported significantly more perfectionism than non-procrastinators. Secondly, procrastinators do appear to engage in perfectionistic behavior for different purposes than non-procrastinators. For procrastinators the motive for “perfect behavior” is aimed at impressing others, which is consistent with a “protective” self-presentation style. By this it is meant that their “perfect behavior” is motivated by anxiety over what others think about their performance. In contrast, non-procrastinators’ perfectionism appears to be motivated by a desire to produce a “flawless product” rather than by external social factors such as approval. The findings of this study are consistent with other research (Ferrari, 1991), which demonstrates that procrastinators attempt to avoid negative feedback about self.

Donovan (1995) takes quite a different approach to exploring procrastination of everyday life. He points out that while anthropologists frequently apply psychological theories to their investigations, they are reluctant to incorporate psychological assessment instruments to help quantify their findings. The author proposed a relationship between death anxiety and general procrastination. He predicted that individuals preoccupied with their own mortality (high death anxiety) would exhibit a lack of motivation for competing

tasks of daily living. This lack of motivation could manifest itself behaviorally as “chronic procrastination.” While “chronic” was not defined, he did argue that there is literature to support the notion that on a broad level both death anxiety and procrastination involve altered perceptions of time. Procrastinators tend to underestimate the amount of time a task will take (Lay, 1986), and individuals with death anxiety experience a sense of time shortening. Donovan used two self-report inventories to test his hypothesis that procrastination is a proxy for death anxiety. Results indicate a very weak, but significant, positive correlation between procrastination and death anxiety. Those individuals experiencing high death anxiety tended to be procrastinators. The author astutely points out that perhaps the small correlation is because procrastination is not simply a motivational deficit but a more complex construct.

Decisional Procrastination. In contrast to academic procrastination and procrastination of daily living, which have been labeled in the literature as behavioral forms of delay (Effert & Ferrari, 1989), decisional procrastination is considered a cognitive type of delay. Also called “neurotic indecision,” it has been defined as the intentional delay in making decisions within some specified timeframe. Like other forms of procrastination, the individual typically experiences some form of discomfort because of the delay.

Janis and Mann (1977) argue that decisional procrastination is an antecedent of behavioral delays, which typically represent a pattern used to avoid dealing with situations perceived as stressful. They suggest that putting off a decision until either time runs out or the decision is made for the procrastinator allow failure to be attributed to factors outside the individual thereby protecting a fragile self-esteem. As will be seen in

this review, decisional procrastination has been related to a variety of cognitive, affective, and personality variables.

Effert and Ferrari (1989) were interested in the personality correlates of decisional procrastination - the tendency to avoid making decisions within a specific time frame. In a correlational study subjects completed several personality inventories. The authors found that decisional procrastinators reported low self-esteem, a propensity for cognitive distortions (e.g., forgetfulness), and a tendency to misjudge the time needed to complete a task. More specifically, these procrastinators underestimate the time needed to complete a task by failing to think about all aspects of the decision. This results in the person needing to work faster to complete the task. This will often lead to poor performance, which reduces self-esteem.

Ferrari (1992) studied female "compulsive procrastinators" with an interest in identifying self-reported personality characteristics. Measures administered included scales of both decisional and behavioral (daily tasks) procrastination, self-esteem, self-consciousness, self-handicapping, intelligence, and identity style. Compulsive procrastination was defined as those subjects scoring one standard deviation above the sample mean on two procrastination inventories. Results indicated that when compared with nonprocrastinators, procrastinators claimed lower self-esteem, greater public self-consciousness, greater social anxiety, and more self-handicapping tendencies. Procrastinators also were less information oriented, had a stronger tendency toward a diffuse identity style, and showed no difference in verbal or abstract intelligence.

Ferrari (1991) continued his investigation into the various ways that procrastinators avoid not only tasks, including decisions, but in doing so avoid obtaining

feedback about their own abilities or lack thereof. Ferrari conducted two studies. The first presented correlational data regarding personality variables. The second was an experimental study that looked at whether procrastinators would choose a performance task that would allow them to avoid any self-relevant information about their ability. As expected, the correlational data showed that decisional procrastination was related to a variety of dysfunctional decision making styles including defensive avoidance (ignoring important information), rationalization (making excuses for avoiding information), and buck passing (reliance on others to make the decision). Procrastination was also related to diffuse-identity orientation and overconcern for social appropriateness.

In the experimental part of the study subjects were identified as either high or non-procrastinators using a median split procedure and then randomly assigned to one of two conditions. In the first condition, Group A, students were told that they would be given information about their performance on a cognitive task of their choosing (either an easy or difficult task). The subjects in the second condition, Group B, were told that their scores would be combined with everyone else's scores, so that no personal information about performance would be given. Results indicated that both procrastinators and non-procrastinators prefer to choose easy tasks, however, only the procrastinators avoided any information about performance regardless of task difficulty level. Ferrari concluded that the stronger the tendency to procrastinate, the stronger the tendency to both avoid making decisions as well as obtaining diagnostic information about oneself. He argued that this supports Burka and Yuen's (1983) popular theory that procrastinators go to any length to protect their fragile self-esteem.

Ferrari and McCown (1994) investigated the relationship between Obsessive Compulsive Disorder (OCD) and procrastination tendencies. Citing Burka and Yen (1983), who argue that anxiety and fear of failure are primary motives for chronic procrastination in that they protect a fragile self-esteem, the authors wondered if the fear and anxiety that individuals with OCD experience would be related to the fear and anxiety individuals experience who struggle with decisional and/or behavioral procrastination. Results indicate that obsessional thoughts are related to decisional but not behavioral procrastination whereas compulsive acts were related to both types of procrastination.

In addition to the prevalence of procrastination among the general adult population, Harriot and Ferrari (1996) were particularly interested in avoidant, arousal, and decisional procrastination. Avoidant procrastination is similar to general behavioral delay also referred to as procrastination of daily life. Arousal procrastination seldom appears in the literature and refers more to a reason for, rather than a distinct category of, procrastination. Arousal procrastination has to do with putting things off as a way to avoid boredom. These individuals put off tasks until the last moment to create a self-imposed time pressure that heightens their arousal and the “rush” of finishing just under the deadline. These individuals have also been referred to as a sort of thrill seeker (Ferrari & Emmons, 1995).

A battery of procrastination inventories and demographic information was solicited from adults from varying career fields who attended a free lecture on procrastination. In this study by Harriot and Ferrari (1996), 20% of the respondents claimed to procrastinate to a significant degree. When compared to the earlier reported

rate for college students the results suggest that perhaps procrastination tends to decrease with age. However, to some degree this may be comparing apples and oranges because the prevalence rates for college students are based upon delaying completion of academic tasks, not on the more general procrastination assessed with this study's sample. They also found some demographic differences in their sample. Higher rates of decisional procrastination were reported by non-college educated individuals. In addition, higher rates of procrastination were reported by individuals who had been married but are no longer, either due to divorce, death, or separation.

The developmental roots of "dysfunctional" procrastination in college age women were the topic of investigation for Ferrari and Olivette (1994). These authors coined the term "dysfunctional" to refer to decisional and avoidant forms of procrastination. A "dysfunctional" procrastination score was obtained by summing the decisional and avoidant scores. Using Baumrind's (1971) typology of parenting styles, Ferrari and Olivette were interested in whether procrastination tendencies were formulated as a result of the type of parenting an individual was exposed to while growing up. Baumrind identified 3 parental authority styles. A permissive parental authority style is characterized as warm and less apt to use punishment. Children of this parenting style tend to lack self-reliance and inquisitiveness. Authoritarian parenting styles control their children through harsh punishment and tend to produce children who are unhappy, withdrawn, and distrustful. The ideal parenting authority style is referred to as authoritative and can be characterized as exerting a high degree of control but also encouraging autonomy in appropriate areas. Children raised with an authoritative parenting style tend to be self-reliant, self-controlled, and inquisitive.

The authors were interested in whether these different parental authority styles were correlated with decisional procrastination (putting off decisions) and avoidant procrastination (putting off tasks). They hypothesized that authoritarian parenting styles would promote higher levels of decisional and avoidant procrastination. They argued that such procrastination would be a safe indirect way to rebel against the controlling demands of the parent. Both mothers and fathers participated in this investigation. Results confirm that the home environment is a major source for the development of chronic procrastination tendencies. Authoritarian and authoritative fathers were positively and negatively associated with procrastination in their daughters respectively. The author's used a median split procedure to group the subjects into 2 groups: dysfunctional procrastinators and nonprocrastinators. The dysfunctional procrastinators had mothers who were reported to be decisional procrastinators themselves. Finally, dysfunctional procrastinators reported higher levels of anger and anger suppression supporting the notion that the procrastination may be a passive-aggressive reaction to an authoritarian parenting style.

Ferrari and Emmons (1995) examined whether decisional and/or behavioral procrastination was related to self-control and frequency of self-reinforcement. Self-control refers to an individual's ability to delay gratification. It is reasoned that individuals with high levels of self-control or restraint will be better able to endure unpleasant tasks and may procrastinate less. Self-reinforcement is the process of an individual rewarding themselves for engaging in desired behaviors. Self-reinforcement can take the form of positive statements made to oneself (e.g., I did a great job) or it can take the form of allowing oneself to engage in a certain behavior (e.g., shopping). It was

hypothesized that procrastinators would show a tendency for less frequent self-reinforcement. In this study college students completed several inventories with analysis indicating a negative relationship between both kinds of procrastination and both self-control and self-reinforcement. These results suggest that students will procrastinate because of difficulty deferring more immediate gratification.

Academic Procrastination. From even a brief perusal of the literature, one can see that the overwhelming majority of investigations address academic procrastination. It has been my observation that less than 10% of all investigations of procrastination, regardless of its type (e.g., decisional), have used non-students for their samples. Since virtually all empirical work has been on college samples with an approximate mean age of 20-22 years old, one could argue that all procrastination research has been research on the young academic procrastinator. Common sense tells us that academic procrastination refers to putting off doing tasks directly related to successfully completing educational goals. These delays can cover a wide range of tasks including (1) postponing the time one intends to begin studying, (2) postponing the moment one actually begins to study, (3) doing things other than studying, (4) turning in assignments past deadline, and (5) producing less than optimal quality work.

There has been much fanfare in the literature on the issue of trait vs. state procrastination. Academic procrastination has typically been regarded as a task-specific behavior rather than a generalized trait (Ferrari et al., 1995). Consequently, most of the early research focused on identifying the skills that needed remediation e.g. time management or study habits. The state/trait distinction in the procrastination literature is ambiguous. Part of that may be due to the nature of procrastination and part may be due

to the subjects that have been studied. For those who treat procrastination as a stable personality trait, the question is how stable are personality traits in very young adults? If trait procrastination is to be considered a “habit” that is manifest across different situations and over time (Senecal, Lavoie, & Koestner, 1997), then it is my opinion that virtually all academic procrastinators are trait procrastinators. Perhaps in time the state/trait distinction will become a useful one. But until research samples become more representative of adults in general or our theories of procrastination are better articulated, the distinction will continue to be arbitrary.

As will be seen in the following section, academic procrastination has been conceptualized in a variety of ways. The diversity of the research into academic procrastination clearly suggests that it is a much more complex phenomenon than simply a situation specific skill deficit. There are cognitive, affective, and behavioral factors involved in all forms of procrastination including those that are academic in nature.

Multiple Factor Studies. Solomon and Rothblum (1984) examined self-reported academic procrastinators in an attempt to establish procrastination as more than simply a deficit in study skills and time management. Introductory psychology students were asked to complete a battery of questionnaires measuring self-esteem, anxiety, study habits, assertion, procrastination, depression, and irrational cognitions. The researchers also included a behavioral task (self-paced quizzes) to provide a further measure of procrastination. The self-report measure of primary interest in this study was the Procrastination Assessment Scale - Students (PASS). It consists of two sections. The first section assesses the prevalence of procrastination in six academic areas (e.g. writing

an essay, studying for an exam). The second section presents scenarios and asks subjects to identify possible reasons for procrastinating on the task presented in the scenario.

Factor analysis of subjects' reasons for procrastinating identified two factors, fear of failure and task aversiveness, accounting for the largest variance in their sample. The investigators tabulated frequency of endorsement of reasons for procrastination and were able to identify two distinct sub-groups of procrastinators. The fear of failure group reported more depression, more irrational cognitions, more anxiety, low self-esteem, and lack of assertion. The task aversiveness group was a larger and more heterogeneous group. Individuals who procrastinated because of task aversiveness can be distinguished from those who procrastinate because of fear of failure by the absence of high trait anxiety and low self-esteem.

McKean (1994) offered an intriguing explanation for academic procrastination. Extrapolating from Seligman's (1975) learned helplessness model, McKean suggested that procrastination could be a behavioral manifestation of "academic helplessness." By this he refers to a "self-defeating pattern involving a rather passive, maladaptive response to a negative event." (p.456). According to Seligman's learned helplessness model, people seek to explain to themselves the positive and negative outcomes they experience. The explanations that people develop are based on 3 dimensions. A person will explain an outcome by attributing it to causes that are (a) internal or external, (b) global or specific, and (c) stable or unstable. Individuals will tend to develop characteristic ways of explaining events along these 3 dimensions. Students who believe that academic setbacks are caused by factors inside themselves (internal), that will affect many of their academic activities (global), and which are long lasting (stable) will give up when faced

with future setbacks. A student developing academic helplessness in reaction to failing to study effectively would typically engage in self-talk as follows: "I was not able to do it because I lack ability, this will affect all my classes, and it's always going to be this way." McKean believes that this type of attributional style leads to style of passive non-responsiveness. One particularly damaging form this passive style can take is procrastination. Among these students, procrastination does not simply result from poor time management skills, or lack of appreciation of the demands involved in completing the task. Rather it is the "embodiment of their helpless non-responsiveness, borne of the belief that the task itself is beyond their efforts to control or complete it." (p. 458).

McKean (1993) investigated the hypothesis that students at risk for academic helplessness would procrastinate more than low risk students. One hundred seventy-eight undergraduates completed scales that identified them as either high or low risk for academic helplessness. As predicted the high-risk group reported significantly higher rates of academic procrastination, offering support that procrastination may be a behavioral manifestation of academic helplessness.

In this next study the authors investigated the relationship among self-efficacy, anxiety, and academic procrastination. Haycock, McCarthy, and Skay (1998) argue that self-efficacy plays a role in whether people initiate and are persistent in completing behaviors. The link between anxiety and self-efficacy is intuitively clear in that one would expect a person with weak efficacy expectations either about their own ability or the likelihood of a desired outcome to experience a significant level of anxiety. As hypothesized, procrastination scores were significantly related to self-efficacy and anxiety. Procrastination was negatively correlated with self-efficacy and positively

related to anxiety. Multiple regression analysis was conducted to evaluate the unique contributions of variance that self-efficacy and anxiety contributes to procrastination in this study. As expected, self-efficacy was a significant contributor to the variance in procrastination, but unexpectedly, after the variance due to self-efficacy was controlled for, anxiety did not contribute significantly to the variance in procrastination. The authors hypothesize that anxiety affects self-efficacy, which in turn affects procrastination. A strength of this investigation is that it offers a concrete approach based on self-efficacy theory to treating academic procrastination.

Cognitive Factors. Ferrari, Wolfe, Wesley, Schoff and Beck (1995) investigated the relationship between Ego-identity status and academic procrastination. Ego-identity status refers to the way individuals process self-relevant information and make personal decisions. Originally proposed by Berozonsky (1990), this social-cognitive model identifies two distinct orientation or identity styles: information-oriented and diffuse/avoidant. While information-oriented individuals purposely seek self-relevant information, diffuse/avoidant individuals take a more defensive approach to information seeking. Diffuse/avoidant individuals are reluctant to deal with problems and decisions, ultimately necessitating them to be more spontaneous rather than planful. These authors were interested in whether identity styles were associated with procrastination. They hypothesized that a diffuse/avoidant style would be positively associated with academic procrastination. Results confirmed the people with a diffuse-avoidant identity style are more likely to engage in academic procrastination than an information-oriented identity style. The information-oriented individuals also reported levels of procrastination higher than the investigators expected. They attempt to explain that the motivation for the

procrastination among information-oriented individuals is different from that of the diffuse/avoidant individuals. They reason that the information-oriented individuals wait to complete tasks until the last minute in order to experience the “rush or thrill” or working against a time limit. In other words the information-oriented individuals procrastinate “on purpose” in order to motivate themselves and increase the sense of accomplishment.

Like Solomon and Rothblum (1984), Ferrari, Parker, and Ware (1992) believe that academic procrastination is not just a behavioral tendency to delay or mismanage school-related tasks but rather “encompasses cognitive and affective components” (p. 496). In this study the authors attempted to determine if such factors could be identified that could predict academic procrastination. The Myers-Briggs Type Indicator (MBTI) is a popular personality inventory used extensively in academic settings for such tasks as academic advising, career development, psychological counseling, and learning styles (Provost & Anchors, 1987). In addition to the MBTI, this study assessed the relationship between academic procrastination and two other cognitive variables, self-efficacy and locus of control. Students enrolled in an Associate of Arts program volunteered to complete several inventories as part of their freshman orientation seminar. Results from this “non-clinical” sample indicate that academic procrastination may not be predicted from the personality factors identified by the MBTI. Additionally, scores on the procrastination inventory were not correlated with academic locus of control. However, scores were negatively correlated with general self-efficacy suggesting that procrastinators believe that they have little mastery over their own behavior and that they are ineffective at mastering general life events.

Vodanovich and Seib (1997) were interested in the relationship between academic procrastination and the ability for individuals to structure their time. A large sample of undergraduate students completed a Time Structure questionnaire and a procrastination inventory. Results show a significant negative relationship between procrastination and scores on the time structure questionnaire. The time structure questionnaire yields 5 subscales related to Sense of Purpose, structure routine, present orientation, effective organization, and persistence. The subscale with the highest negative correlation with procrastination was the effective organization scale. Stepwise multiple regression indicated that the effective organization subscale was the best predictor of procrastination. The effective organization subscale assess one's "activity, organization, and motivation" (p. 214). The fact that this subscale best predicts procrastination is not surprising if it is placed within the context of being suggestive of relatively poor executive functioning.

Several authors have proposed a link between academic procrastination and irrational beliefs (Ferrari & Emmons, 1994, Solomon & Rothblum, 1984, Beswick, Roghtblu, & Mann, 1988) however, these studies have suggested that the link is weak or non-existent. Bridges and Roig (1997) re-examined the link between irrational thinking and academic procrastination because "context effects" potentially contaminated the earlier findings. They cite research (Council, 1993) that suggests that when multiple self-report inventories are given at the same time, the subjects infer a relationship among them and adjust their responses accordingly. Administering the inventories one at a time at different points in time can eliminate these context effects. Bridges and Roig (1997) administered the Procrastination Assesment Scale – Students and the Irrational Beliefs

Inventory (IBI) (Koopmans, Sanderman, Timmerman, and Emmelkamp, 1994) at separate times with separate investigators. Results found a small but significant positive correlation between self-reported procrastination and the global IBI score. A stronger positive correlation was found between procrastination and the problem avoidance subscale of the IBI. Surprisingly, the IBI worrying subscale was not related to procrastination, a finding for which the authors had no explanation.

Flett, Blankstein, Hewitt, and Koledin (1992) examined the potential significance of perfectionism as a model for procrastination. They posit that some of the inconsistency with earlier research into perfectionism had to do with treating the construct as unidimensional in nature. Was perfectionism referring to an individual having extremely high expectations for themselves (self-oriented)? Did it refer to person expecting flawless performance from others (other-oriented)? Or did it refer to others expectation for superior performance from us (socially prescribed)? Flett et al. (1992) note the development of new multidimensional measures of perfectionism which will allow for better clarification of the relationship between procrastination and perfectionism. Using one of those new measures, they examined the relationship between perfectionism, general procrastination, and academic procrastination. As expected, socially prescribed perfectionism was positively related to both general and academic procrastination. A frequently cited explanation for procrastination, fear of failure, was also positively correlated with socially prescribed perfectionism.

Affective Factors. Milgram and Sadeh (1994) were interested in the relationships between 5 aspects of academic procrastination: behavioral delay, personal upset about the delay, how aversive the task is perceived, how capable one feels about doing the task, and

the desire to reduce behavioral delay in the future. In their sample of Israeli high school students they found that how much students delayed on a task was only weakly related to how upset they were about delaying. Students delayed more on academic tasks that were labeled unpleasant regardless of how capable they felt in accomplishing them. The participants were much more willing to admit to procrastinating for reasons that was least threatening to their self-esteem (e.g. problems in time management) than to reasons that was more threatening (e.g. lack of ability). Finally, the single strongest predictor of desire to change delaying behavior was feeling a sufficient degree of personal upset about procrastinating. While this study established that not all procrastinators are bothered by their behavior, the authors did not explain why this was so. One possible explanation is that these students did not represent a sample of students' self-reporting procrastination problems but rather were responding to hypothetical academic tasks.

Lay (1994) was also interested in the emotional experiences of procrastinators. The two emotions he was most interested in are anxiety (agitation) and depression (dejection). The rule of thumb has been to assume that procrastinators generally experience anxiety while delaying the completion of a task and dejection after the fact when reflecting upon their dilatory behavior. Lay was interested in clarifying the anxiety before and depression after procrastination hypothesis. Seventy-eight undergraduates completed a variety of inventories before and after a writing assignment that required them to write down thoughts and feelings about past study habits. Unexpectedly, multiple regression analysis suggested that the agitation/dejection relationship is reversed. In this sample, dejection is the principle affective reaction when contemplating upcoming tasks and agitation appears more prominent in retrospection. I did not find this

result too surprising. Given that academic procrastinators develop lower efficacy expectations about their performance abilities (Haycock, McCarthy & Skay, 1998), one would expect dysphoric feelings about beginning future tasks. In addition, it has been established that procrastinators are overly concerned with appearing competent even to the point of choosing easy tasks that do not build self-confidence. As a result it is reasonable to expect procrastinators to experience anxiety when disclosing prior incidents of significant task delays thereby exposing their “dirty secret.”

Lay’s findings do not establish definitively that anxiety is not a precursor to task avoidance and delay. Rothblum, Solomon, and Murakami (1986) evaluated students at three different times during the course of a semester to assess cognitive, behavioral, and affective characteristics of procrastinators. Self-reported procrastinators were found to report higher levels of test anxiety, weekly state anxiety, and anxiety related physical symptoms. What Lay’s findings do suggest is that the affective experiences of procrastinators are more complex than first thought.

Typological Approaches. McCown and Johnson (1991) attempted to classify procrastinators into different types based upon personality variables. These authors used the typology for academic procrastinators developed by McCown, Johnson, and Pretzel, (1989), which is drawn from Eysenck’s personality factors of psychoticism, extraversion, and neuroticism. The Type I procrastinator, which is related to the Eysenckian factor of psychoticism (P), is characteristically impulsive and anti-authoritarian and tends to resist deadlines imposed by others. Type II individuals are characterized by extraversion (E) and neuroticism (N), tend to be overly confident in their ability to perform expected tasks in the allotted time, and find themselves running out of

time. Type III procrastinators are characterized by high N, low E, and show low self-confidence in their abilities and are prone to negative affect such as depression. The current study looked at these factors and their relationship to measures of study behavior in university students during final exams week. A strong point of this study is that the authors attempted to operationally define “chronic procrastination” in their sample. They defined chronic procrastinators as those students who at the time of finals week were well behind in obtaining experimental credits for the psychology class. Additionally, only students who scored in the top quartile on a self-report procrastination inventory were included in this study.

This attempt to objectively define the chronicity of procrastination is sadly missing in the literature in general. However, it is not clear that McGown and Johnson’s (1991) operational definition adequately addresses the issue of chronicity. Rationally, their inclusion criteria address more directly the issue of severity, which is also conspicuous by its absence in the literature. The author’s inclusion criteria do not address how long, in a general sense, these students procrastinate to this level of severity. Results were obtained in the expected directions. In this group of identified procrastinators, the Eysenckian factors of N, P, and E were associated with actual study behaviors in the direction that the factors would predict. For example, N was associated with higher levels of anxiety regarding exams and a lack of confidence in preparation consistent with the Type III procrastinator.

Consequences of Academic Procrastination.

Roig and DeTommaso (1995) investigated the possible link between procrastination and academic dishonesty (plagiarism and cheating). Their subjects, from

a private 4-year university, demonstrated a small but positive correlation between cheating, plagiarism, and procrastination. Subjects' scores on all inventories were divided into three groups using the method of extreme groups in an attempt to compare "high vs. low procrastinators." This was done by dividing the distribution of procrastination scores into thirds and then comparing the top versus bottom third. Separate 2x2 analyses of variances of the cheating and plagiarism scores yielded no significant effects for cheating. The analysis was significant for plagiarism with a main effect for high vs. low procrastinators but not for sex. The authors cautiously conclude that procrastination may play a role in academic dishonesty.

Tice and Baumeister (1997) investigated the potential costs and benefits of procrastination to health, stress, and performance, using a longitudinal approach to the study of academic procrastination. By incorporating behavioral measures (when a term paper was turned in) in addition to self-report inventories, the authors were able to obtain a more detailed look at this disabling behavior. Results from this group of 44 undergraduate students indicated that there was a strong positive correlation between scores on the procrastination inventory and the date when the term paper was turned in.

As expected, procrastinators turned in their papers later than non-procrastinators. A median split procedure was used to identify procrastinators and non-procrastinators. Procrastinators also received significantly lower grades on the term paper and on two exams. An additional finding was that procrastinators reported significantly less stress and fewer physical ailments early in the semester compared to non-procrastinators. However, this trend reversed by the end of the semester. By that time procrastinators were reporting significantly more physical symptoms, stress complaints, and visits to the

student health center. The authors suggest that this study shed light on the benefits and costs of academic procrastination. Despite the apparent short-term benefits of procrastination, the long-term costs far outweigh these benefits. They conclude that procrastination “cannot be regarded as either adaptive or innocuous. Procrastinators end up suffering more and performing worse than other people” (p.458).

Experimental Studies.

As noted earlier in this literature review, virtually all studies of procrastination have used non-experimental correlational research designs. Also relatively rare in this area of research is the use of behavioral measures of procrastination. The typical study employs self-report measures for assessing both procrastination and the various other variables researchers have been interested in. There are some notable exceptions where the investigators used objective measures to evaluate procrastination, such as tracking the number of lessons completed in a self-paced course is an example of a behavioral measure. Others have asked subjects to mail back an envelope by a designated date as their objective measure. Over the past 8 years, there have begun to appear experimental investigations into procrastination that incorporate objective measures to back up the self-report inventories, thus potentially improving the construct validity of programmatic procrastination research.

Milgram, Weizman, and Raviv (1991) examined the relationship between a new behavioral measure of academic procrastination and three personality traits (self-control, passive-aggressiveness, and test anxiety). The authors selected these three traits because they have been theoretically and empirically implicated in procrastination. Female college students were randomly assigned to one of eight experimental conditions during

which they were instructed to complete a task over four consecutive nights. In addition, they completed a small battery of personality tests. Unlike any study reviewed to this point, no self-report measure of academic procrastination was utilized. Instead, procrastination was defined as the “cumulative delay of students in complying with the instructions to complete a test battery consisting of performance tasks at a scheduled time over a number of sessions” (p.125). In other words, students were timed each night to quantify how long they delayed in starting and completing the experimental tasks.

As predicted, students with low self-regulation ability and high test anxiety showed longer delays on the behavioral procrastination measure. The correlation between the behavioral procrastination measure and passive-aggressiveness was not significant. Passive-aggressiveness was correlated with test anxiety but not with self-control. Analysis of Variance indicated several interactions among the three personality variables providing evidence that both personal trait as well as situational factors effect academic procrastination.

Continuing with this type of investigation, Senecal, Lavoie, and Koestner (1997) used an experimental design including a behavioral measure to look at personal and situational factors in procrastination. They specifically were interested in how procrastinators would manage their time in a laboratory analogue of a real-world situation. Rather than looking at self-control, test anxiety, and passive-aggressiveness, they wanted to establish what effect performance evaluation and frame of reference had on procrastination. They hypothesized that students would procrastinate more when they expected to be evaluated and when the frame of reference was focused on skills rather than interests. The subjects were randomly assigned to one of four conditions in a 2

(anticipated vs. not anticipated evaluation) X2 (interest vs. performance-based frame of reference) factorial design. Procrastination was behaviorally defined as the latency to begin the most aversive task as well as the total time to complete the four tasks.

As expected, students who described themselves as trait procrastinators on the self-report inventory, took more time overall to complete the task and also took the longest time to start the most aversive task. This was particularly true when they were expecting their performance to be evaluated. In contrast, being evaluated did not negatively influence low-trait procrastinators. The authors suggest that their findings support the popular “fear of failure” explanation of procrastination. They further argue that procrastination is so widespread in academic settings because performance feedback is so frequent. Finally, because no main effects, only interaction effects were found, Milgram, Dangour, and Raviv’s (1991) statement that procrastination is mediated by both state and trait factors is supported.

Summary/Critique.

The procrastination literature has been heuristically rich as evidenced by the proliferation of investigations over the last 15 years. Research on the various correlates of different types of procrastination has yielded important findings but it also reveals significant disorganization that is present in this area of investigation. Staats (1991) notes that fragmentation and diversity in methodology, theoretical language, and perspectives are indigenous to sciences early on their pathways to unification.

Three issues that are important to the objectives of this dissertation are symptomatic of the fragmented approach currently employed to studying procrastination.

1. Object of Study. From a review of the literature a dichotomy emerges regarding the "object" of investigation. Various studies (Effert & Ferrari, 1989; Solomon & Rothblum, 1984; Milgram, Sroloff, & Rosenbaum, 1988; Milgram, Dangour, & Raviv, 1991) focus on investigating specific types of procrastination (e.g., academic, decisional, routine life tasks), while others (Ferrari, 1991; McCown & Johnson, 1991; Muszynski & Akamatsu, 1991; Flett, Blankstein, Hewitt, & Koledin, 1992) focus on the types of procrastinator (e.g., neurotic, perfectionistic, pessimistic). This tendency to separate the person from the behavior contributes greatly to the fragmentation of the literature.

2. Do procrastinators differ in important ways depending on the chronicity and severity of their procrastination? Despite the rapid growth of procrastination research, the issues of chronicity and severity are rarely operationalized in the literature. In psychological research, chronicity typically refers to the duration while severity connotes the intensity. It is my opinion that chronicity and severity represent two distinct dimensions, which are relevant to any discussion regarding the etiology or treatment of procrastination. The most frequent approach to the issue of severity in the literature involves separating the subjects into "high vs. low" procrastinators. The most popular method of dividing procrastinators into these categories is by median split (Ferrari, 1991; Ferrari & Olivette, 1994). Median split refers to labeling all subjects scoring above the median on a procrastination measures as procrastinators and all those falling below the median as "non" or "low" procrastinators. It is important to note that this arbitrary division does not necessarily have any clinical significance. Subjects that are labeled as "high" may not be reporting levels of procrastination that would be considered problematic by either self-report or negative consequences (poor grades). The benefit of

the procedure is primarily statistical as it allows data to be categorized making them amenable to methods of analysis of variance.

In their study of the relationship between Eysenck's personality factors of neuroticism, extraversion, and psychoticism to procrastination, McCown and Johnson (1991) identify their sample as being university students suffering from "chronic" procrastination. These students were identified as being "chronic" even though the term was undefined. From reviewing the article it appeared that they authors were actually interested in the severity not chronicity of procrastination.

Confusion between chronicity and severity is also evident elsewhere in the literature. McCown and Johnson (1989) in their abstract describe their sample as consisting of "227 chronic academic procrastinators." In this study procrastinators were operationally defined as those subjects who (1) scored in the top quartile of norms for the two administered procrastination inventories, (2) had obtained less than one half of needed experimental credits for a class by the last month of that class, (3) signed up for an experimental session during the last 3 weeks of the class. While these authors are to be commended for their attempt to objectively define procrastination, it is unclear as to what dimension they were attempting to define. The first criterion is an apparent reference to severity while the following two are more suggestive as to the duration of the procrastinatory behavior

Another good attempt to address the issue of severity was made by Ferrari (1991), who defined "compulsive" procrastinators as those subjects in his study scoring one standard deviation above the sample mean on two procrastination inventories. Milgram, Gehrman, and Keinan (1992) used the construct of manifest emotional upset to attempt to

differentiate between types of procrastinators. Emotional upset refers to the presence and degree of negative affect as the result of engaging in procrastinatory behavior. The authors felt that the use of emotional upset as a variable might be useful in establishing a typology of procrastinators. The use of emotional upset is at least a rough reference to the issue of severity.

3. What are the consequences of severe procrastination? It is my clinical experience that there are individuals who suffer distressing consequences (e.g., academic probation, job loss) as a result of their procrastination. Conspicuous by its relative absence in the literature is discussion of the actual costs or consequences of procrastination. There has been ample reference to the possible benefits of procrastination, for example, in terms of protecting a fragile self-esteem. Typically, reference to consequences involves academic performance e.g. grade point average, which has yielded contradictory findings. Solomon and Rothblum (1988) found a negative correlation between procrastination and academic performance while other studies (Solomon & Rothblum, 1984; Lay, 1986) found no effect on academic performance. There have been two relatively recent studies that have taken different but interesting approaches to looking at the costs of procrastinating. In a longitudinal study, Tice and Baumeister (1997) found that procrastinators showed early benefits but greater long term costs compared to non-procrastinators in terms of higher levels of stress, lower grades, and more frequent physical illnesses. Roig and DeTammasso (1995) explored the relationship between procrastination and academic dishonesty (cheating and plagiarism). They discovered a positive relationship between procrastination and academic dishonesty

suggesting one possible consequence of procrastination is resorting to extreme potentially disastrous behavior,

A possible explanation for not addressing the issues of severity, chronicity, and consequences of procrastination may be found in subject selection. The typical sample in the procrastination literature has been recruited from undergraduate psychology courses. Such samples are not likely to be representative of procrastinators in general or even of all student procrastinators. They may differ in important ways, for example, from procrastinators who voluntarily seek treatment because of their procrastination or from students who have already suffered real consequences like academic probation as a result of task avoidance. I have not come across a single procrastination study that used self-referred procrastinators for their sample. This suggests that the student procrastinators sampled in the literature to date largely represent "non-clinical" samples of convenience that are likely very different from a more severe "clinical" group of procrastinators. A reasonable interpretation of the typical procrastination sample is that these students find their procrastination annoying but hardly incapacitating. These are students who by the very fact that they are university students have been able to attain goals despite their self-reported procrastination. A critical consequence of omitting issues such as chronicity and severity is a truncating of the variance in studying procrastinatory behavior. By focusing exclusively on non-clinical samples of procrastinators, a great deal of information is lost regarding our understanding of procrastination. For the purposes of my research, the issues of type of procrastinator/procrastination, the clinical/non-clinical continuum, and consequences of procrastination are all central to investigating the contribution of neuropsychological factors to procrastination.

From this review of the procrastination literature it is clear that even though research in this area is proliferating, this literature remains plagued by fragmentation. The research seems to be struggling for a direction and is not systematically moving towards addressing such important issues as theory and treatment of procrastination. Unfortunately this current research project will do little to directly address these issues. Its purpose is not to “defrag” the procrastination literature. Rather, it attempts to throw another iron into the fire by raising the possible role of neuropsychological variables. The sections that follow review literature pertinent to neuropsychological factors in procrastination. After defining executive functioning ability and presenting evidence that it is primarily served by the frontal lobes of the brain, behavioral disturbances associated with frontal lobe injury will be reviewed. Following that, neurological variability in a "normal" populations will be explored with the intention of demonstrating that executive functioning ability is not fully developed in all young adults, suggesting the possibility that executive functioning deficits exist in a "normal" population. Finally, it will be suggested that procrastination is a possible behavioral manifestation of deficient executive functioning.

Executive Functioning

Defined.

Executive functioning refers to those abilities that allow an individual to successfully perform independent, goal-directed and self-serving behavior (Lezak, 1983). Sohlberg and Mateer (1989) argue that executive functioning ability is fundamental to competency in everyday functioning. It is important to distinguish executive functioning ability from other cognitive abilities such as memory, language, attention, and perception.

Executive functioning refers to higher order abilities that enable a person to effectively use all available cognitive skills in goal directed behavior. Another way to conceptualize the distinction is to consider cognitive skills as the “what” we know and executive functioning abilities as representing the “how” effectively we use what we know.

Lezak (1983) parsimoniously defines executive functioning as having four components: (1) goal formation, (2) planning, (3) implementation of goal-directed plans, and (4) effective performance. Each of these components has a distinct set of behaviors and all are necessary for "appropriate, socially responsible, and effectively self-serving adult conduct" (p. 507). Lezak suggests that executive functions are so central to effective functioning that even mild deficits in these abilities can lead to a serious compromise of an individual's ability to be effective in daily activities. “So long as the executive functions are intact, a person can sustain considerable cognitive loss and still continue to be independent, constructively self-serving, and productive” (p. 42).

Pennington (1991) suggests that executive functions refer to the processes such as planning, organizational skills, optimal set maintenance, selective attention, and inhibitory control. He more generally defines executive functioning as the “ability to maintain an appropriate problem solving set for the attainment of a future goal” (p. 13).

Perecman (1987) defined executive functioning as a supraordinate ability that is fundamental to achieve a specific goal. Very similar to Lezak's conceptualization, she identifies anticipation, goal selection, and monitoring as central to executive functioning. She identifies the process as follows: a goal must first be anticipated and established, then planning is necessary. Once the behavior has been initiated, the actions must be carried

out in a proper order and the results along the way must be monitored and behavior adjusted accordingly.

If one looks critically at the procrastination literature, there are several instances where the researchers seem to be implicating executive type functions as contributing to procrastination. Lay (1986), in his validation study for a procrastination inventory, included scales of neurotic disorganization, organization, energy level, self-esteem, and academic achievement. Procrastinators scored high on neurotic disorganization and low on the organization scales. Inconsistent with the studies reported earlier, self-esteem was not correlated with procrastination. High scores on the neurotic disorganization scale describe someone who "finds it difficult to focus his attention on the details of everyday activity; is absent-minded, easily distracted and poorly organized; has trouble accomplishing things on time and is very forgetful." There are interesting similarities between individuals scoring high on neurotic disorganization and what one would expect from persons with deficient executive functioning. Ferrari, Wolfe, Wesley, Schoff, and Beck (1995) described a "lack of planfulness" by procrastinators secondary to a diffuse/avoidant identity style. If an individual procrastinates long enough, then circumstances rather than preparation eventually determine the outcome. Such a lack of preparation and difficulty with planning maybe an expression of identity style however other explanations are plausible.

In outlining their intervention for treating procrastination, Haycock, McCarthy, and Skay (1998) identify "getting started" on a specific task as a common problem for procrastinators. They suggest that the skills necessary for initiating a task need to be "isolated and broken down into small attainable steps" (p 321). They suggest that low

self-efficacy leads to less initiation and persistence on a task which ultimately leads to avoidance behavior. The ability to independently break a task into steps and form a plan to accomplish those steps clearly falls within the domain of executive functioning. While Haycock et al. (1998) were discussing procrastination as a function of low self-efficacy, they did not offer a possible explanation for the possible genesis of low self-efficacy other than poor past performances. Could those past poor performances on academic tasks and the accompanying difficulties with initiation and planning be related to executive functioning?

Another study that is potentially suggestive of the relationship between executive functioning and procrastination is by McKean (1994), who looked at the relationship between yet another variable, learned helplessness, and procrastination. The author posits that students can develop academic helplessness in the face of repeated academic failures in which the student comes to believe that the outcome of his/her work is unrelated to the effort exerted. Students are particularly vulnerable because college is New World requiring new and different strategies to be successful. The ability to meet such new demands tasks the strength of a student's executive functioning abilities. McKean addresses the behavioral, cognitive, and affective consequences of academic helplessness, however, he fails to hypothesize possible etiological reasons for the behavior.

In summary, executive functioning is central to a person's ability to engage in independent and successful goal oriented behavior. If an individual has relatively weak executive functioning abilities, such as difficulties with goal formation, planning, or implementation of plans, then procrastination could be an expression of these difficulties.

The very same procrastination that is currently being attributed to cognitive and affective variables such as task aversiveness, fear of failure, laziness, low self-efficacy, and diffuse identity style may indeed be a deficit in executive functioning ability.

Executive Functioning and the Frontal Lobes.

It is widely accepted that executive functioning is neuroanatomically localized primarily in the frontal lobes of the cerebral cortex (Pennington, 1991) anterior to the central sulcus and superior to the Rolandic fissure (Mattson & Levin, 1990). More specifically, executive type functions are localized in what is known as the pre-frontal lobe referring to areas of the cerebral cortex just anterior to the frontal lobes. In the literature the terms frontal and pre-frontal are essentially used interchangeably with regards to executive functioning. Not possessing specific sensory or motor functions, its abilities are considered supra-modal and the frontal cortex is considered to be primarily association cortex meaning it is responsible for higher order integrative processes. The frontal lobes regulate the state of the organism, control the essential elements of the subject's intentions, program complex forms of activity, and constantly monitor all aspects of activity (Hecaen & Albert, 1975). Poremba (1987) states that the frontal lobes of the brain are involved in the highest level of goal directed acts including complex sequencing and the creation of long and short-term plans.

While there is a consensus in the literature that executive functions are mediated by the prefrontal areas of the cortex, a taxonomy of how and specifically where the various executive functions are located within the prefrontal areas has not been developed (Pennington, 1991). There have been many theories of pre-frontal functioning (Goldman-Rakic, 1988; Fuster, 1985). Shallice (1988) proposed a model of frontal

functioning that distinguishes between routine and non-routine actions. He proposed that non-frontal areas of cortex handle routine actions while non-routine or novel actions require the activation of prefrontal executive areas. Using a planning task (the Tower of Hanoi), Shallice found some evidence that patients with frontal lesions were impaired on non-routine tasks compared to patients with more posterior lesions. Perecman (1987) concurs that different brain areas mediate routine vs. non-routine acts. She argues further that when a novel act becomes routinized through practice, posterior brain areas are sufficient to maintain it. She cites a study by Mazziotta, Phelps, Carson, and Kuhl (1982) that used positron emission tomography to show non-frontal activation for thoroughly learned motor acts and frontal lobe activation for newly acquired motor acts. Even though our understanding of the frontal lobes is less well developed than our understanding of the functions of other areas such as the temporal and parietal lobes, the limbic system, or sub-cortical structures, it is widely accepted that the frontal/pre-frontal areas of cortex represent the home of executive functioning abilities.

Behavioral Disturbances associated with frontal lobe damage.

There is an extensive clinical literature on the effects of brain lesions in the frontal lobes in general and executive functioning in particular (Duncan, 1986; Karnath, Wallesch, & Zimmermann, 1991; Petrides & Milner, 1982; Damasio, 1979; Hecaen & Albert, 1978). Basic sensory, motor, and speech functions remain intact with prefrontal damage while complex goal directed behavior deteriorates. In fact, prefrontal lesions can be associated with impairment in control of all functions, both cognitive and emotional, because of the massive number of afferent and efferent connections between the prefrontal cortex and almost every other brain area. (Kaczmarek, 1987). Deficits in

executive functioning can also result from damage in sub-cortical regions that subserve the frontal lobes.

It is important to note that a person can suffer substantial losses to their cognitive abilities and may still be able maintain an effective and independent lifestyle. However, even mild damage to executive functioning ability can render a person with intact cognitive abilities essentially disabled (Lezak, 1995). The behavioral consequences of frontal damage can be profound regardless of whether the injury was incurred during adulthood or childhood (Grattan & Eslinger, 1992; Williams & Mateer, 1992).

Walsh (1991) describes changes in executive functioning that are typically associated with injury to the frontal lobes (referred to as the frontal syndrome). These changes are (1) poor abstract ability, (2) lack of flexibility in changing cognitive set, (3) deficient adaptive problem solving, and (4) decreased planning capacity. Zeigarnick (1949) noted that soldiers who had suffered damage to their frontal lobes lacked, among other things, initiative. These soldiers needed external sources of stimulus to guide their behavior. Lezak (1983) classifies behavioral disturbances associated with frontal lobe damage into five general categories. The category relevant to this study is referred to as "problems with starting" (p.81). An individual with "problems of starting" will demonstrate decreases in productivity, initiative, and ambition. These qualities are especially prevalent when attempting novel tasks. This individual will perform satisfactorily on routine tasks of daily living. To others he/she will appear lazy or apathetic. They can "talk a good game" about plans and intentions, but they are virtually unable to transform the words into deeds.

Shallice and Burgess (1991) investigated deficits in planning abilities associated with frontal lobe damage. Subjects were required to carry out 8 tasks that were written on a card. Six of the tasks were simple such as buying a loaf of bread. The seventh task was to be at a certain place in 15 minutes and the eighth task was to find out certain information about 4 things such as the price of a loaf of bread. They were also given certain rules, which further increased the complexity of the tasks. These subjects were forced to develop a strategy for accomplishing these tasks. Compared to control subjects, the subjects with frontal lobe damage tended to break the rules and have more difficulty completing the tasks. Similar difficulties with following rules and planning have been replicated with a route finding task using mazes (Canavan, 1983). An interesting finding is that these types of subjects can recite the very rules they are unsuccessful at implementing.

Stuss, Benson, Kaplan, Weir, Naeser, and Lieberman (1983) argue that the deficits of the frontal lobes are illuminated when the individual attempts to transform knowledge into action. When presented with a task, which requires the sequencing of multiple steps or that requires organizing complex responses, the individual's performance immediately. Baddeley (1986) coined the phrase "dysexecutive syndrome" to refer to the disorganization of behavior that accompanies damage to the frontal/pre-frontal areas.

While adequate executive functioning ability is integral to independent functioning, it is particularly central when attempting unstructured tasks. People vary on the amount of structure (external assistance) needed to effectively accomplish tasks (Lezak, 1983). As noted earlier, individuals with compromised executive functioning

ability can perform routine tasks with relative ease. It is when attempting novel and/or difficult tasks particularly with time constraints that problems with executive functioning ability are illuminated. It is very interesting to note that most interventions for remediating procrastination teach individuals to plan and execute more effectively (Lay, 1990; Lamwers & Jazwinski, 1989; Roberts, Fulton & Semb, 1988). In essence these approaches externally impose the structure that individuals have difficulty imposing for themselves internally.

Only one study has been located that explicitly cites procrastination as a direct sequela of brain injury. Strub (1989) documents the case of a 60-year-old man with a frontal lobe syndrome following a cerebral hemorrhage. The reported residuals of his injury include apathy, social withdrawal, and decreased motivation. Intelligence remained within normal limits. This man was described as knowing what is required of him at work yet he chronically procrastinated and left details unattended. This case is suggestive of the connection between neuropsychological factors and procrastination.

It has been the intention of this review so far to establish that executive functioning is integrally involved with the successful execution of goal-directed behavior. Furthermore, damage to the parts of the brain that serve executive functioning ability result in a cluster of behavioral deficits that can include procrastination-like behavior.

Neurological Variability in a "Normal" Population.

To this point it has been suggested that some individuals procrastinate because of deficient executive functioning abilities which makes managing the complex demands of an unstructured academic environment very difficult. The likelihood of finding a

neurological basis to procrastination is increased if there is some developmental evidence, which could support the type of deficiency or delay suggested above.

The frontal lobes are the most recent phylogenetic region of the brain. The prefrontal regions are virtually non-existent in the rodent brain and occupy 3.1% of the neocortex of the cat, 13% in apes, and 24% in man (Perecman, 1987). The development of prefrontal areas and the development of their functions have traditionally been seen as occurring quite late in the course of normal brain development. Others have argued that the first emergence of many prefrontal functions, e.g. selective attention and inhibition, are observable during the second half of the first year of life (Pennington, 1991). Despite this, Pennington (1991), argues that executive functions do have a very protracted course of development.

The axons within and leaving the prefrontal cortex begin to myelinate during the sixth month after birth and are the last part of the cortex to complete myelination. Yakolov and Lecours (1967) indicate that the completion of the myelination process of the frontal lobes does not occur until the third decade of life. The later development of this areas supports the notion that higher, later maturing functions are involved (Spreeen, 1983).

Luria (1973) proposed a developmental timeframe for different “functional systems” in the brain. A functional system refers to the process whereby several brain regions simultaneously mediate a behavior. One of his proposed functional systems is referred to the output/planning unit. It consists primarily of the frontal lobes and represents the highest functional level of the brain, responsible for planning and carrying out behavior. Luria proposed that the output/planning unit developed between the ages of

12 and 24, which he believes corresponds to the developmental timeframe of the frontal cortex. It is interesting that the developmental timeframes believed to be operating with the frontal cortex correspond to the typical age for college students. It therefore seems plausible that many individuals may experience functional deficits secondary to possible developmental delays in executive functioning.

Cognitive psychologists have also established that there is considerable variability in adults' abstract thinking ability. Approximately 40% of normal adults do not attain formal operational thinking defined as the ability to "construct totally hypothetical mental representations and then to perform various complex cognitive operations on those representations" (Shute & Huertas, 1990, p 2). Pennington (1991) concurs that there is a rough correspondence between the development of executive functions and the different Piagetian stages of cognitive development. He suggests that these stages of cognitive development can be "reconceptualized as changes in the nature and complexity of the executive strategies or mental representations that can be held online in working memory to guide behavior" (p. 16).

Relevant to the purposes of this study is whether similar variability is present with regards to executive functioning. Shute and Huertas (1990) were intrigued by the proposition that "variability in cognitive development reflects variability in frontal lobe function." (p. 3). More specifically, they were interested in developmental variability in frontal lobe functioning of normal college undergraduates. They wanted to compare performance on measures of frontal lobe functioning with measures of formal operational thinking ability. They supposed that sufficient frontal lobe development is required for the attainment of formal operational thinking. They administered an abbreviated

neuropsychological test battery (Booklet Category Test, Wisconsin Card Sorting Test, Trails A & B, and Digit Symbol), a clinical interview (Piagetian Shadows Task) to determine level of cognitive development, and 4 cognitive tasks to 58 college undergraduates with no history of neurological illness or trauma. Results indicate a "strong relationships between the cognitive development measure and measures of frontal lobe dysfunction" (p. 8). Those subjects who successfully negotiated the abstract reasoning demands of the classical Piagetian Shadows Task were also those who scored highest on the measures of frontal lobe dysfunction. These findings suggest that the ability for the highest levels of abstract reasoning require adequate frontal lobe development. Those subjects who performed best on the frontal lobe measures, which are also considered to be measures of executive functioning, were the same subjects who attained the highest levels of cognitive development. It was also found that the mean score of their sample on the measure of cognitive development was 3.6, which falls below the cutoff score for the attainment of abstract reasoning ability. This study provides evidence that in a "normal" sample 1) there is significant variability in frontal lobe functioning, 2) measures of cognitive development and frontal lobe functioning are correlated, and 3) adequate frontal lobe development is necessary to attain abstract reasoning abilities. Formal operational thought (abstract reasoning) and executive functioning ability are very similar. Although Shute and Huertas (1990) provide evidence of variability in frontal lobe functioning, various behavioral expressions of such variability were not addressed. From an evolutionary perspective, executive function skills should be subject to more variation than many other areas of brain function because of both the relative and absolute size of the prefrontal cortex has increased dramatically

in recent evolution. Thus like the language area of the brain, the frontal lobes should be particularly vulnerable to developmental pathologies (Pennington, 1991).

Summary/Research Questions

It has been the objective of this entire review to establish various points including:

1. Procrastination is a serious problem that afflicts a large number of individuals.
2. Collectively, the procrastination research has clearly established a plethora of various cognitive, personality, affective, psychological, and behavioral factors associated with procrastination.
3. The procrastination literature has made virtually no reference to the possible contribution of neuropsychological variables to explaining this behavior.
4. The executive functioning and developmental variability literature suggests the possibility of the role of neuropsychological factors in procrastination.

The purpose of the current study was to investigate the role of neuropsychological factors in severe academic procrastination. Academic procrastination was selected rather than other types of procrastination (e.g., daily tasks) because an academic environment is full of demanding, novel, and unstructured tasks. It is such tasks that can bring to the forefront potential deficits in executive functioning.

More specifically, the following question was raised: Will severe or "clinical" procrastinators demonstrate deficits in executive functioning ability on reliable and valid measures of executive functioning? My predictions are:

1. A "clinical" group of community college students participating in an academic monitoring program or on academic probation will report

significantly higher levels of academic procrastination than a control group of community college students not on academic probation.

2. There will be a negative relationship between academic procrastination and performance on three measures of executive functioning ability. As academic procrastination increases, performance on measures of executive functioning ability will decrease.
3. For clinical procrastinators, scores on measures of executive functioning ability will account for a significant amount of variance in academic procrastination above and beyond the variance explained by other independent or control variables.
4. Executive functioning ability, depression, ADHD status, and general intellectual ability will combine to predict group membership (i.e., procrastinators vs. controls).

It is important to clarify that the goal of this study is not to establish the presence of "brain damage" in clinical procrastinators. If performance deficits are found, they would not be indicative of brain damage. Rather such results may be suggestive of a developmental delay or a non-pathological dysfunction of the same order as Dyslexia, Attention Deficit Disorder, or Developmental Arithmetic Disorder (American Psychiatric Association, 1996). The question is not one of "damage" but rather of "dysfunction." This potential dysfunction has yet to be adequately diagnosed and treated. With the high incidence of procrastination among college students (cited earlier), it is imperative that counseling psychologists have a better understanding of this disabling behavior.

CHAPTER III

METHOD

Subjects.

Two groups of subjects were recruited from Lansing Community College (LCC) in Lansing, Michigan and Glendale Community College (GCC) in Glendale, Arizona. Both colleges have similar number of students and serve cities of similar size (approximately 100,000). A group of students on academic probation and a control group were recruited from LCC and GCC. The director of counseling services at LCC provided permission to recruit students from their Academic Monitoring Program (AMP). Students who participate in the AMP do so because they have been dismissed from school because of poor academic performance and have essentially been placed on academic probation. These students sign a contract that binds them to work to improve their academic performance and to regularly meet with an academic counselor. In exchange they are permitted to continue enrollment at LCC.

I sent a letter on LCC letterhead and signed by the Director of the Counseling Center to students in AMP soliciting their participation in a research project (See Appendix H). The letter informed the students about the study and said that they would be reimbursed \$10 for their hour of participation. At GCC the same recruitment letter was approved by the Registrar and was mailed to all students on academic probation for Spring semester of 1998. For both LCC and GCC the recruitment letter produced a response between 5 to 10 % of the letters mailed. The recruitment letters produced a total of 59 responses. I experienced significant difficulties getting the probation students to follow through with participation. Over 60% of the students on academic probation did

not return phone calls or show up for their scheduled appointment. In order to recruit additional subjects, flyers were posted in classrooms at GCC advertising \$10 to students on academic probation that were interested in participating in a research project. This produced the additional subjects necessary to complete this study.

The control group, which consisted of community college students who have never been on academic probation, were recruited through Introduction to Psychology classes at GCC. The control subjects were told that students were needed for a research study of factors that interfere with students completing community college in a timely manner. They were told that their participation entered them into a lottery for 3 cash prizes of \$100, \$50, and \$25.

Instruments

Pertinent subject information was obtained using a Client Information sheet (see Appendix B). Information requested was age, sex, ethnic background (optional), number of semesters spent at community college to date, credits completed to date, declared college major, grade point average, whether on academic probation and, if yes, how many times, whether they have documented learning disability, whether they had ever received special education services, where they had ever experienced seizures or a serious head injury, and whether they feel as if they have experienced problems in school because of procrastination.

Procrastination Questionnaire. The dependent variable in this study, procrastination, was assessed by using the Time Use Questionnaire (TUQ) (See Appendix D) which consists of 19 self-report items (Aitken, 1982). Each item is ranked on a 5 point Likert Scale from 1 = True to 5 = False. Scores are summed across the 19

items with 8 of the items scored in the reverse direction because they are worded in the negative direction. The scores on the TUQ can range between 19 and 95. The PQ has an internal consistency coefficient alpha of .85. With regards to construct validity, the TUQ significantly correlates (.37 - .48) with several behavioral indicators of academic procrastination including test studying behavior and beginning/completion of term papers. Aitken (1982) stated that the TUQ appears to be a “reliable, useful instrument to use in assessing procrastination among college students.” When compared to other existing self-report procrastination questionnaires like the Procrastination Assessment Scale – Students (PASS) (Solomon and Rothblum, 1984), the TUQ has better internal consistency, higher correlations with objective behavioral measures of academic procrastination, and more items allowing for more variability in responding.

Neuropsychological functioning was assessed by a short battery consisting of two subtests from the Wechsler Adult Intelligence Scale-Revised (Wechsler, 1981), The Tinkertoy Test (Lezak, 1983), the Controlled Oral Word Association Test (Benton, Hamsher, Varney, & Spreen, 1983), and the Ruff Figural Fluency Test (Ruff, Light, & Evans, 1987). Together these tests are designed to provide information regarding a variety of neuropsychological and cognitive functions including (a) executive functioning, (b) general intellectual ability, (c) visuospatial conceptualization, (d) visuomotor coordination and constructional ability, (e) verbal fluency, (f) nonverbal fluency, (g) divergent thinking, (h) cognitive flexibility.

Vocabulary Subtest. The Vocabulary subtest of the Wechsler Adult Intelligence Scale - Revised (WAIS-R) (Wechsler, 1981) was used in conjunction with the Block Design subtest of the WAIS-R) to give a reliable and valid estimate of general intellectual

ability (Silverstein, 1982). This subtest measures a variety of functions including language ability and fund of information. It is the single best measure on the WAIS-R of verbal and general mental ability. The Vocabulary subtest also involves memory, concept formation, and reasoning ability. The subtest requires the subject to verbally give definitions to a list of 35 words of increasing difficulty level. The definitions given by the subject reflect the nature of a person's thought processes, its depth, extent of analysis, and more subtle nuances of emotions and values. The Spearman-Brown corrected split-half reliability coefficients range from .94 to .96 across nine age groups from age 16 to 74, with an average reliability coefficient of .95 (Wechsler, 1981). The two-subtest short form (Vocabulary and Block Design) has a correlation of .90 with Full scale IQ and a reliability of .94 (Silverstein, 1982).

Block Design Subtest. The Block Design subtest of the Wechsler Adult Intelligence Scale - Revised (WAIS-R) (Wechsler, 1981) was used to assess visuomotor coordination and visuospatial conceptualization. It was also used in conjunction with the Vocabulary subtest to give a valid and reliable estimate of general intellectual ability. The subject is asked to use red and white blocks to construct replicas of stimulus patterns printed on a smaller scale. This subtest is timed and can reveal a great deal about the subject's thinking processes, problem solving style, and temperament. The Spearman-Brown corrected split-half reliability coefficients range from .83 to .89 across nine age groups from age 16 to 74, with an average reliability coefficient of .86 (Wechsler, 1981). The two-subtest short form (Vocabulary and Block Design) has a correlation of .90 with Full Scale IQ and a reliability of .94 (Silverstein, 1982).

The Tinkertoy Test. The Tinkertoy Test (TTT) (Lezak, 1983) is a simple and straightforward test devised to assess executive functioning ability. The subject was given fifty Tinkertoy pieces and asked to "make whatever you want." The subject was told that he/she would have at least five minutes to work on it. Tinkertoys are a childrens construction toy consisting of plastic objects of various sizes and shapes (e.g. dowels, spools). Unlike most mainstream measures of executive functioning ability like the Wisconsin Card Sorting Test or the Category Test, the TTT provides less structure for the subject. Typically, the testing environments combined with the standardized tests provide a great deal of external structure, which makes it difficult to observe the subject's ability to impose the structure him or herself. The TTT allows the subject to initiate, plan, and structure a potentially complex activity. The open-ended nature of the TTT better reflects independent goal oriented behavior, which is the heart of executive functioning ability. The TTT also provides " a more comprehensive assessment of goal-oriented behavior than do other tests: from formulating a goal, to planning and organizing the steps, to sequencing of the motor plan and self-correction" (Malcom, 1993, p. 3). These core functions of goal formation, planning, carrying out, and regulation of performance are "absolutely essential to the maintenance of social independence in a complex society" (Lezak, 1983, p. 513).

Lezak (1983) developed a scoring system for the TTT (See Appendix E). The constructions are scored by the total number of Tinkertoy pieces used (TTT_{np}) in the construction as well as a complexity of the construction (TTT_{comp}). The complexity score consists of seven subscores for variables such as symmetry, three dimensionality, mobility, and whether the name of the construction fits its appearance. In her initial

study, Lezak (1982) found significant differences on TTT_{np} and TTT_{comp} scores between subjects with known brain injuries who were either able to live independently without supervision and a group of subjects who were dependent for assistance with their daily functioning. The dependent group scored lower on both TTT scores. The independent group also had lower scores than healthy control subjects. Cicerone and DeLuca (1990) used the TTT along with the Trailmaking Test (another test of executive functioning ability) and other measures of verbal ability, perceptual organization, and attention to predict ratings of activities of daily living (ADL). The executive functioning factor represented by the scores on the TTT and Trailmaking Test was the most significant predictor of ADL ratings for outpatients with a history of traumatic head injury. Bayless, Varney, and Roberts (1989) found that unemployed subjects with a closed head injury performed significantly more poorly on the TTT_{comp} than the employed subjects with a history of closed head injury.

Malcolm (1993) developed two new scoring systems for the TTT which extends Lezak's (1982) standard scoring system by focusing on the process of construction rather than just on the end product. These experimental scales were developed as part of a larger study that, in addition to developing a new scoring system, offered further reliability and validity information regarding the standard scoring system. Malcolm administered the TTT as well as a full neuropsychological battery including traditional measures of executive functioning. Additionally two behavior-rating scales were completed for each subject. Subjects were individuals with a history of closed head injury living in a long-term inpatient rehabilitation facility. A comparison group of healthy control subjects were also utilized in the study. The first important finding of this study was the two new



experimental scoring systems were no better than Lezak's (1982) standard scoring system (TTT_{np} and TTT_{comp}). Concerning construct validity, the TTT standard scores correlate well with other tests of executive functioning (Wisconsin Card Sorting Test, .62 for categories achieved; Ruff Figural Fluency Test, .53 for the number of unique designs) With regards to ecological validity, the TTT was able to successfully predict "behavioral rating scale scores after the variance accounted for by other neuropsychological measures" were taken into account. (Malcolm, 1993, p.52). Interrater reliability of TTT scores ranged from .76 to .97 for TTT_{np} and TTT_{comp} respectively. Test-retest reliability coefficients were .46 for TTT_{comp} and .66 for TTT_{np}. While both test-retest reliabilities were statistically significant, they are strongly suggestive that the motivational state of the subject is important.

Controlled Oral Word Association Test: The Controlled Oral Word Association Test (COWAT) (Benton & Hamsher, 1976) is a test of verbal fluency that is also known as the Word Fluency Test and the FAS Test. Subjects are asked to say as many words that they can think of that begin with a certain letter (F,A,S). Proper nouns, numbers, and words with the same prefix but a different suffix are excluded (e.g. run, runs). The subject is given one minute for each letter. Word fluency is strongly associated with both age and education so total raw scores are adjusted yielding corrected percentiles (Benton & Hamsher, 1976). Test-retest reliability for adults has been reported as .88 and .70 in older adults (Snow et al., 1988).

Word fluency tasks provide an "excellent means of finding out whether and how well the subject organizes his thinking" (Estes, in Lezak, 1983, p. 330). While there are various types of verbal fluency tests (i.e. naming items in a category), the COWAT

provides the least amount of structure by only providing the first letter and in doing so makes it a difficult task for subjects who have trouble developing strategies for themselves.

Word fluency, as measured by the COWAT, "has proven to be a sensitive indicator of brain dysfunction" (Lezak, 1983, p. 331). Crockett et al. (1986) reports that the COWAT is the best discriminator between groups with known frontal lesions and those with non-frontal lesions. Frontal lobe lesions regardless of their side typically depress scores on the COWAT with lesions on the left producing lower word production than right side lesions (Perret, 1974). Bilateral frontal lesions reduce verbal fluency even more than left frontal lesions (Benton, 1968).

Ruff Figural Fluency Test: The Ruff Figural Fluency Test (RFFT) (Ruff, Light, & Evans, 1987) is a test of nonverbal fluency analogous to the verbal fluency tests such as the COWAT (Ruff, 1988). The RFFT consists of five sections, each of which includes a short practice section followed by a one-minute trial. In each section, a pattern of dots is arrayed in a circular pattern within a square area. Over successive sections, the arrays of dots are either presented in a random pattern or are accompanied by visual distracters. Both of these modifications of the first section make the task progressively more difficult. The subject's task is to make as many different designs possible within the time limit by connecting two or more dots with straight lines. Each design has to be different in some way from all the others.

Two scores are derived for the RFFT: the total number of Unique Designs a subject makes across all five sections, and an Error Ratio which is calculated by dividing the total number of design perseverations by the total number of unique designs

generated. The Error Ratio is an "index of planning efficiency" (Ruff, 1988, p. 9). These two raw scores are adjusted for age and education and then converted to percentiles. A qualitative evaluation of the subject's performance is also recommended by Ruff to determine the type of strategies, if any, employed by the subject. Test-retest reliabilities for the number of Unique Designs for the normative group ranged from .58 to .69 for sections one through five and .76 for total number of Unique Designs. With regards to discriminant validity, the RFFT is not significantly correlated with motor speed, aphasia, verbal fluency, or memory. Factor analyses of the RFFT demonstrate that the RFFT "assesses planning, initiation, and divergent reasoning in both clinical and nonclinical groups" (Ruff, 1988, p 21).

Jones-Gotman and Milner (1977) have found that right frontal groups produce more perseverative errors and less novel output than subjects with lesions located in other areas of the brain. Furthermore, there is a double dissociation between verbal and non-verbal fluency whereby a right frontal lesion group was more impaired on a design fluency task while a left frontal lesion group was significantly more impaired on a word fluency task. Ruff, Evans, & Marshall (1986) when comparing head injured patients with controls found that the RFFT is also sensitive to the severity of injury. They found that figural fluency to be more impaired for both Unique Designs and Error Ratio in the severe compared to moderate head injury group.

The neuropsychological tests just discussed form a brief test battery that taps the frontal lobes in general and executive functioning specifically. In addition, this test battery allows for an accurate estimate of a very important potential confounding

variable; intellectual functioning. In order to control for two other feasible confounding variables, depression and Attention Deficit Disorder, two other tests were administered.

The Beck Depression Inventory (BDI) (Beck, Steer, & Garbin, 1988) was used as a measure of depression (See Appendix G). It is important to control for the presence of depression and ensure that it is not suppressing performance on the neuropsychological measures. The BDI is a widely used research and clinical instrument. Reliability ratings (i.e., test-retest, internal consistency), have ranged from .86 to .93 (Reynolds & Gould, 1981; Beck, 1970). Concurrent validity with other self-report depression scales such as the Zung Self-Rating Depression Scale (Zung, 1969) and the MMPI D-Scale (Beck, 1970) are good.

The Wender Utah Rating Scale (WURS) (Ward, Wender, & Reimherr, 1993) is a twenty-five item self-report inventory that was used to identify the possible presence of Attention Deficit Hyperactivity Disorder (ADHD). Subjects reported on a Likert-type scale whether they demonstrated certain behaviors as a child (See Appendix H). Using a cutoff score of 46, the WURS correctly classified 86% of the adults with attention deficit hyperactivity disorder, 99% of the normal control adults, and 81% of adults with unipolar depression (Ward et al., 1993). Split-half reliability comparing the odd/even items for the normal comparison group was .90. With regards to validity, a Pearson correlation coefficient of .41 was obtained when correlating scores on the WURS with the Parents Rating Scale. The Parents Rating Scale is a heavily used and psychometrically sound instrument that identifies the presence of ADHD in children. Higher scores on the WURS were also correlated with a better response to a pharmacological intervention for

ADHD for patients who participated in a placebo study (Wender, Reimherr, Wood, & Ward, 1985).

Procedure

Design. Because this research is the first investigation to look at neuropsychological variables and procrastination, a passive or correlational field design was utilized. According to Heppner, Kivlighan, and Wampold (1992), this type of design is very helpful especially in the early stages of an investigation: "A researcher can quickly and relatively easily describe possible relationships among variables" (p. 215). Because a correlational design is low on internal validity (no random selection or assignment), no cause-effect conclusions could be drawn from this study. However, it can be particularly helpful in disconfirming hypotheses (e.g., when no significant relationship is found between key variables). A strength of this design is its external validity, which Gelso (1980) argues is critical for counseling research. Since this study took place on college campuses and used subjects with genuine concerns (no induction of procrastination occurred), generalizability was facilitated.

Data Collection. All subjects initially completed a consent form and a Client Information sheet (See Appendix A & B). On top of the consent form was a number that would identify the subject for the remainder of the study. The consent form was then separated from the test packets thus protecting the confidentiality of the subjects. The primary investigator individually tested all but 3 of the subjects. All subjects were either tested in a private room located on the respective campuses or at the subject's home if transportation was a problem. Forty-five of the 63 subjects were tested on campus. The average testing time was between 45 and 60 minutes. The primary investigator scored all



test protocols. To permit the establishment of inter-rater reliability, a Ph.D. level psychologist also scored the TTT constructions. The instruments were presented in the following orders:

1. Client Information Sheet
2. 2. Time-Use Questionnaire (TUQ)
3. Wender Utah Rating Scale (WURS)
4. Beck Depression Inventory (BDI)
5. Vocabulary Subtest of the WAIS-R
6. Block Design Subtest of the WAIS-R
7. Controlled Oral Word Association Test (COWAT)
8. Tinkertoy Test (TTT)
9. Ruff Figural Fluency Test (RFFT)

Upon completion of the testing the subjects were debriefed about the nature of the study. Questions were answered at that time and the subjects were asked not to talk with others about their participation. They were also informed that if they desired information about the results, to leave their addresses and a summary would be mailed to them at a later time. Each subject in the AP group was then given \$10 cash. The professor for the Introduction to Psychology course was given the money for the lottery for the control subjects, which he administered after all students who wished to participate had done so.

CHAPTER IV

RESULTS

Description of Sample.

The subjects in this study were 65 community college students who had not yet completed their two-year degree. One subject, however, needed to be excused for a personal emergency during the middle of testing and never consented to completing the testing. A second subject also discontinued participation during the middle of testing when their parent asked me to leave because strangers were not permitted in the house. Evidently the student had not received permission for me to come to the home. This student was unwilling to complete participation at a later time.

Of the remaining 63 subjects, 30 (47.6%) were in the control group (CG) and 33 (52.4%) were in the Academic Probation (AP) group. Sixty-six percent of the subjects were female and 34 % were male. Based on ethnicity, 64% were Caucasian, 18% were Hispanic, 11% were African-American, 6% were Asian, and 1% responded as "Other". The mean age for the sample as a whole was 24.1 years ($SD = 6.7$) with a range from 17 to 46 years of age. The mean number of credits completed by the subjects was 24.8 credits with a range from zero to 65 credits. Sixty credits are required to obtain an Associate of Arts degree. The mean grade point average was 2.49 on a 4.0 scale with a Standard Deviation of 1.1. Looking at the combined sample, 7.9% reported having a diagnosed learning disability, 9.5% reported previously receiving special education services, 3.2% reported having a history of seizures, and 6.3% reported sustaining a head injury. All 5 of the subjects who reported having a learning disability were in the academic probation group, as were 5 of the 6 who had special education, and 3 of the 4

who had head injuries. One question on the Information Sheet (See Appendix B) asked whether they had experienced problems in school because of procrastination. Fifty percent of the subjects responded that it had been a problem and 50% reported that procrastination had not been a problem in school.

Preliminary Analyses.

For the semesters during which data was collected, Lansing Community College (LCC) had an enrollment of 17,152 and Glendale Community College (GCC) had 18,088 students enrolled. For LCC, 54.7% were female and 45.3% were male. For GCC, 55.2% were female and 44.8% were male. For LCC, the ethnic breakdown was as follows: 73.7% Caucasian, 8.5% Hispanic, 8% African-American, 2.7% Asian, and 7.1% other. For GCC, the ethnic breakdown was as follows: 69.8% Caucasian, 15.5% Hispanic, 4.1% African-American, 4.1% Asian, 1.8% Native American, and 4.7% other.

For the semesters during which data was collected, 3.7% of LCC students were on academic probation while 2.5% of GCC students were on probation. For LCC 56.1% were male and 43.9% were female. For GCC, 54.2% were male and 45.8% were female. The ethnic breakdown for students on probation at GCC were as follows: 60% Caucasian, 18.4% Hispanic, 8.7% African-American, 4.6% Asian, and 9.3% other. Information regarding ethnicity for students on probation at LCC was not available.

The academic probation sample obtained for this study was 57% female and 43% male. The control group of students in good academic standing was 71% female and 29% male. With regards to ethnicity, 76.7% of the control group were Caucasian compared to 51.5% for the academic probation group. The control group was 10%

Hispanic and 6.7% African-American, while the academic probation group was 24.2% Hispanic and 15.2% African-American.

To evaluate the reliability of the subject's scores on the TTT, a second rater was recruited who also scored all 63 constructions. The second rater and I independently scored the constructions generating two scores; one for total number of pieces utilized and the other being the complexity score. The inter-rater reliability was $r = .862$. There was perfect agreement between the raters for 61.9% of the subjects, raters differed by one point for an additional 27% of the subjects, differed by two points for 11.1% of the subjects. The two raters never disagreed by more than two points

The remaining statistical analyses done in this exploratory study consisted primarily of t-tests and correlations. The t-tests for the executive functioning variables were one tailed with an alpha level of .05. All other t-tests were two tailed. Because multiple t-tests were conducted thereby increasing the probability of finding significant differences due to chance, the Bon Ferroni adjustment was used, which adjusted the alpha for each t-test to .004.

Demographic Group Comparisons.

Table 1 lists the means, standard deviations, and t-values for the AP and the control group for the demographic variables included in this study. There were no significant differences between the groups in the number of semesters completed and the number of credits completed. However, there was a significant difference between the groups in grade point average. The average grade point average (GPA) for the control group was 2.84 and for the AP group was 2.09 ($t = 2.65, p < .01$). A significant correlation was found between GPA and scores on the Time Use Questionnaire ($r = -.39$,

Table 1

Mean Comparisons on Demographic Variables for the Academic Probation and Control Groups

Variables	Academic Probation		Control Group		t-value	p
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
Age	25.2	7.8	22.9	5.3	1.34	ns
Credits	22.3	17.2	27.4	19.4	1.07	ns
Semester	4.3	2.5	3.6	2.5	0.97	ns
GPA	2.1	0.86	2.8	1.1	2.65	<.01
	N = 33		N = 30			

GPA = Grade Point Average

$p < .01$) for the entire sample in this study. As procrastination scores increase GPA decreases. This relationship was true for both the AP and control groups. There were also differences between the control group and the AP group on ethnicity. Seventy-six percent of the control group was Caucasian, compared to only 51% of the AP group. Conversely, the control group was 10% Hispanic and 7 % African American, while the AP group was 24% Hispanic and 15% African-American.

Group Differences in Procrastination.

The first prediction, that subjects in the Academic Monitoring Program or on academic probation (AP) would report significantly higher levels of academic procrastination than a control group, was supported. The AP group had a mean score of 55 on the Time Use Questionnaire compared to a score of 44.7 for the control group ($t = 3.25, p < .001$). There were also significant differences in reported procrastination levels between the groups. Sixty-four percent of the AP group reported that procrastination was a problem compared to only 36% of the control group ($X^2 = 4.57, p < .05$).

Group Differences on Control Variables.

As indicated in the methods section, several variables were included to control for their potential relationships with executive functioning performance. The three variables are depression (BDI), Attention-Deficit Disorder (WURS), and intellectual functioning (IQ). Table 2 contains the means, standard deviations, and t values for the two groups for these three variables. The AP group scored significantly higher on depression with a mean score of 11.6 on the BDI while the control group had a mean of 6.1 ($t=3.26, p < .001$). There were no significant differences on the Wender Utah Rating Scale between the two groups ($t = 1.09, p < .28$). An additional important finding was that there was no

Table 2

Mean Comparisons of Control Variables for the
Academic Probation and Control Groups

Variables	Academic Probation		Control Group		t-value	p
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
BDI	11.6	7.5	6.2	5.6	3.26	<.001
WURS	28.6	16.5	24.4	13.7	1.09	ns
FSIQ	96.9	0.44	98.1	11.9	0.44	ns
	N = 33		N = 30			

Note: BDI - Beck Depression Inventory
WURS - Wendor Utah Rating Scale
FSIQ - Wechsler Adult Intelligence Scale Full Scale IQ

significant mean difference on IQ. The AP group had an estimated Full Scale IQ of 96.9 while the control group had a Full Scale IQ of 98.1 ($t = .44, p < .66$).

Group Differences on Measures of Executive Functioning.

Table 3 lists the means, standard deviations, and t-values for the AP group and the control group on the 3 measures of executive functioning. No significant differences were found between the two groups on the COWAT and the TTT. On the RFFT total number of constructions, the AP group performed significantly worse (Raw score = 67.2) than the control group (Raw score = 85.1)($t=3.12, p < .001$). There was no significant difference between the two groups on the Error Ratio score, which is an indication of perseveration, of the RFFT.

Relationship between Procrastination and Executive Functioning Measures.

The second prediction, that academic procrastination and performance on three measures of executive functioning would be significantly inversely related, was not supported. The correlation matrix in Table 4 reports the relationships between the executive functioning measures and procrastination, and between all the executive functioning measures. Procrastination scores on the Time Use Questionnaire (TUQ) were not correlated with verbal fluency on the COWAT($r = .112$), non-verbal fluency on the RFFT ($r = -.126$), and general executive functioning ability on the TTT complexity index ($-.002$). Both the TTT and the RFFT contain additional scales that were also included in the analysis. It was found that the error ratio score on the RFFT was not significantly correlated to the TUQ ($r = -.177$). Neither of the additional TTT scales, total number of pieces and total elapsed time for the construction, were significantly related to procrastination scores ($r = -.002, r = .176$ respectively)

Table 3

**Mean Comparisons of Executive Functioning
Measures for the Academic Probation & Control Groups**

Variables	Academic Probation		Control Group		<u>t-value</u>	p
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
TUQ	55	13.2	44.7	11.7	3.25	<.001
COWAT	36.6	9.5	37.4	7.6	0.38	ns
RFFT	67.2	23.3	85.1	22.3	3.12	<.001
RFFT _{er}	44.2	9.1	43.9	8.9	0.14	ns
TTT _{np}	26.2	12.8	25.2	11.9	0.32	ns
TTT _{comp}	7	1.5	7	1.6	0.01	ns
TTT _{time}	240.5	122.7	253.7	139.4	0.40	ns
	N = 33		N = 30			

Note: TUQ = Time Use Questionnaire

COWAT = Controlled Oral Word Association Test

RFFT = Ruff Figural Fluency Test

RFFT_{er} = Ruff Figural Fluency Test Error Ratio Score

TTT_{np} = Tinkertoy Test Total number of pieces

TTT_{comp} = Tinkertoy Test Complexity Score

TTT_{time} = Tinkertoy Test Total Time to complete construction

Table 4

Intercorrelations between the Time Use Questionnaire (TUQ)
and Measures of Executive Functioning

Variables	1	2	3	4	5	6	7
1. TUQ	--						
2. COWAT	0.11	--					
3. RFFT	-0.13	0.36*	--				
4. RFFT _{er}	-0.18	-0.02	0.16	--			
5. TTT _{np}	-0.00	0.24	0.24	0.02	--		
6. TTT _{comp}	0.04	0.17	0.39*	-0.05	0.64*	--	
7. TTT _{time}	0.18	0.15	0.21	0.02	0.45*	0.44*	--

N = 63

* p < .01

Among the measures of executive functioning, several significant relationships were found. Verbal fluency (COWAT) did significantly correlate with non-verbal fluency (RFFT) ($r = .355, p < .01$). The RFFT was also correlated with the complexity score on the TTT ($r = .391, p < .01$). The remaining significant relationships were between the 3 different TTT scores: total number of pieces used in the construction (TTT_{np}), total time taken to complete construction (TTT_{time}), and the complexity of the construction (TTT_{comp}). All three of the TTT scores produced large positive intercorrelations ranging from $r = .441$ between TTT_{comp} and TTT_{time} to $r = .641$ between TTT_{np} and TTT_{comp} (all $p < .01$).

A step wise linear regression was run to test the third prediction that the executive functioning variables would explain a significant amount of variance in the procrastination scores after accounting for the potential control variables of depression, intelligence, and ADHD status. All control variables are continuously scaled and were entered into the regression in step one. The three measures of executive functioning are also continuous variables and were aggregated to produce one overall executive functioning score for each subject. Results of the step-wise multiple regression were non-significant. Step one, which consisted of the three control variables, produced a $R^2 = .055, F(3,58) = 1.13, p = .346$. Step two, which incorporated the aggregate measure of executive functioning, was also non-significant with a $R^2 = .059, F\text{-to-change}(3,55) = .084$. Based upon the results of the analysis conducted so far, the proposed discriminant function analysis to test prediction four was not done. Since the correlation matrix and the step-wise multiple regression showed a non-significant relationship between the independent and control variables and procrastination scores, the analysis became moot.

Post Hoc Comparisons.

Because of the unexpected findings of this study, further post hoc analyses were conducted in an attempt to further clarify a possible relationship between procrastination and executive functioning. All subjects who self-reported procrastination in this study (N=32) were divided into either a high or low procrastination group through the use of a median split and then subjected to t-tests. Table 5 presents the means, t-scores, and p-values for the 3 control variables and 5 executive functioning measures. From a review of Table 5, no significant mean differences were found between the high and low procrastination group. Furthermore, the means were not consistently elevated in the expected direction. Based upon the predictions of this study, it would be expected that the low procrastinators compared to high procrastinators would perform better on the executive functioning measures. However, the high procrastinators produced higher scores on the COWAT, TTT_{np}, and TTT_{comp}. The only measure that the two groups performed as expected was the RFFT total score where the high procrastinators produced fewer unique designs than the low procrastinators.

The last post hoc analysis conducted revisited prediction 2 that there would be a negative correlation between scores on academic procrastination and performance on measures of executive functioning. As reported earlier, no significant correlation was found in this study. In that analysis the scores for the entire sample (N=63) were utilized to test the hypothesis. While that sample size increased the power of the analysis making lower correlation coefficients statistically significant; it also included all of the control subjects for whom no relationship between procrastination and executive functioning was expected a priori. In order to explore the relationship between the clinical procrastinators

Table 5

Mean Comparisons of Control Variables and Executive
Functioning Measures for High and Low Procrastinators

PROCRASTINATION				
	High	Low		
Variables	<u>M</u>	<u>M</u>	<u>t-</u> <u>value</u>	<u>p</u>
BDI	12.5	9.0	1.30	ns
WURS	30.3	26.1	0.71	ns
WAIS-FS	98.8	95.9	0.71	ns
COWAT	38.8	36.1	0.79	ns
RFFT	35.6*	37.6*	0.54	ns
TTT _{er}	42.6	45.8	0.96	ns
TTT _{np}	29.6	24.5	1.05	ns
TTT _{comp}	7.4	6.8	1.27	ns
	N = 16	N = 16		

* T -Scores

and executive functioning, correlations were computed between the measures of executive functioning and the TUQ for the Academic Probation (AP) group. Based on the AP sample size of 33, a correlation of at least .35 is required for statistical significance. Consistent with the earlier finding, none of the correlations between the TUQ and executive functioning were significant. The only correlation that exceeded $r = .20$ was between TUQ and the TTTtime ($r = .21$).

CHAPTER V

DISCUSSION

This exploratory study had two goals. The first goal was to successfully identify and investigate a group of “clinical” procrastinators whom do not represent the “samples of convenience” that predominates the procrastination literature. The second goal was to explore the relationship between academic procrastination and executive functioning ability. As mentioned earlier, the procrastination literature has inadequately addressed the issues of chronicity and severity of procrastination in their samples. The typical approach to defining the severe and chronic procrastinators has been to take students from undergraduate psychology courses and divide them into high and low procrastination groups by using a median split procedure based upon questionnaire scores.

In the current study, the attempt to identify and investigate a group of “clinical” procrastinators proved successful. It was predicted that students who were on academic probation or who were being monitored for poor academic performance would produce higher scores on a reliable and valid measure of procrastination. This prediction was strongly supported with the academic probation group producing a significantly higher mean score than a control group of psychology students.

Further evidence that the academic probation group in this study represents a group with severe and chronic procrastination can be found by looking at Aitken’s (1982) original sample from which she developed the procrastination questionnaire used in the current study. In her validation study, Aitken administered the procrastination questionnaire to 120 freshman and sophomore university students (62% women, 38%

men). The mean total procrastination score was 46.4 (SD = 12.0), virtually identical to the mean of 44.7 (SD = 11.7) obtained for the control group in the current study. It is also interesting that the sex breakdown in the current study (66.7% women, 33.3% men) is remarkably similar to Aitken's sample. Both Aitken's mean of 46.4 and the mean of 44.7 obtained in this current study are far below the mean of 55.0 (SD = 13.1) obtained in this study for the academic probation group. The control samples from the current study and the Aitken study are typical of subjects of whom most of our understanding of procrastination has been founded. Significantly less is known about the cognitive, affective, and behavioral correlates of severe and chronic procrastinators such as those identified in this study.

For the procrastinators in this study, their behavior has had deleterious consequences including significantly lower grade point averages as well as statistically significantly higher levels of reported depression when compared to the control group. This study has demonstrated an effective way of identifying those individuals for whom procrastination is potentially debilitating. It is imperative that future research into procrastination takes the issue of sampling seriously if the field hopes to help those individuals who are most adversely affected by this condition.

While the goal of identifying and investigating a group of clinical procrastinators was met, the same cannot be said for the second and primary goal of this investigation, namely, to establish the presence of executive functioning deficits in those individuals with chronic and severe procrastination. The discussion about sample selection provides some reasonable assurance that the procrastinators in this study were not garden-variety procrastinators for whom the behavior is simply annoying or inconvenient. Rather they

represented a group of individuals who were falling behind and having difficulty completing college classes as indicated by their presence in either the academic monitoring program or being placed on academic probation. The difficulties the procrastination group is experiencing cannot be attributed to differences in other variables such as intelligence or the presence of a learning disability for there were no significant differences between the procrastinators and the control group on these variables. It was hypothesized that these community college students struggled with relatively weaker executive functioning abilities, which made it difficult for them to manage the demands of the college environment

The failure to find a significant relationship between procrastination and several measures of executive functioning was unexpected. As addressed in the literature review, there was reasonable justification for expecting an important relationship between procrastination and executive functioning ability. Additionally, the most prolific writers in the field of procrastination (Ferrari, Johnson, & McCown, 1995) suggest the feasibility of such a relationship. The current findings suggest three plausible explanations: 1) There is no relationship among the variables, 2) the current sample was too small to provide the power to detect the relationships, or 3) the measures of executive functioning that were selected were inadequate in measuring the abilities under investigation. With regards to the first explanation, as is reflected in Table 4, none of the 6 indices of executive functioning was significantly correlated with scores on the procrastination questionnaire (Time Use Questionnaire). The only significant relationship in Table 4 was among the measures of executive functioning. The COWAT and RFFT were positively correlated, which is consistent with other research (Demakis and Harrison, 1997) which

found a positive relationship, in their sample of 134 college students, between these same measures of verbal and non-verbal fluency. The RFFT was also positively correlated with the TTTcomp score, which is consistent with Malcolm's (1993) results. Also consistent with this current study is the Malcolm's finding of no significant relationship between TTTcomp scores and scores in verbal fluency (COWAT). Since the TTT is a non-verbal constructional task that is conceptually closer to the RFFT than the COWAT, it is not surprising that the TTTcomp would not be significantly related to the COWAT.

The only finding potentially suggestive of a relationship between executive functioning and procrastination was a mean difference on the RFFT with the academic probation group performing significantly more poorly than the control group. Since it was established that the academic probation group does represent a group of severe procrastinators (prediction 1), it can be suggested that the severe procrastinators performed significantly more poorly on a task of executive functioning than the control group.

This group difference on the RFFT is not only statistically but clinically significant as well. The mean score of 67.2 designs for the AP group (SD = 23.2) corresponds to a T-score of 34.2 which falls in the low average range. The control group's mean of 85.1 unique designs (SD = 22.1) falls into the average range. The performance of the control group is remarkably similar to the mean score of 86.9 unique designs (SD = 21.9) obtained by Demakis and Harrison (1997). In their study, they administered the RFFT to 134 college students to investigate the correlation between the same verbal and non-verbal fluency measures utilized in the current investigation. The similarity in performance by the Damkis and Harrison sample and the control group in

this current study further establish a real difference in non-verbal fluency between clinical procrastinators and control subjects. What specific ability these two groups differ in is still unclear based on the results of the current study. The RFFT provides information about divergent thinking, cognitive flexibility, and the ability to use planning strategies. The lack of support for prediction 2 makes it impossible at this point to argue for which specific executive functioning ability, if any, is responsible for the large performance difference.

Two other analyses supported the first explanation that no relationship exists between procrastination and executive functioning ability. Means were also compared by dividing the entire study sample into procrastinators and non-procrastinators regardless of whether they were on academic probation. The assignment to each group was based on the subject's response on the demographic sheet (See Appendix A) to the question "do you feel like you have experienced problems in school because of procrastination?" When comparing these two groups, there was no significant difference on any of the executive functioning measures. One last comparison was done which involved dividing the just mentioned procrastination group into a high and a low group using a median split procedure. When the high and low procrastination groups were compared on the COWAT, RFFT, RFFT error ratio, TTT_{np}, and TTT_{comp} no significant mean differences were found.

The second potential explanation for finding no significant relationship between procrastination and executive functioning involves the possibility of having committed a Type II error. It is conceivable that the sample size employed in this exploratory study was too small, lacked power, and that the hypothesized relationship between executive

functioning and procrastination exists but is not being detected. From visually inspecting the correlations in Table 4 it can be seen that several of the executive functioning measures had correlations above .10 suggesting a weak but non-significant relationship. If the sample size had been increased and the size of the relationships remained unchanged, then there would have been statistical significance but questionable practical significance of the findings.

Since there was no prior research in this area of investigation to provide a guideline as to an expected effect size, Cohen's rule of thumb approach for classifying effect size was used. With an $\alpha = .05$, power = .80, and an estimated effect size of .5 standard deviations, the sample size obtained in this study exceeds the recommended sample size of 25 subjects per group. Given the size of the correlation coefficients obtained in addition to the results of the post-hoc analysis, the likelihood of a Type II error seems very remote.

The third potential explanation for the lack of findings between executive functioning and procrastination touches on a fundamental assumption of this study. The results of this study are predicated on the assumption that the selected measures of executive functioning and procrastination are reliable and valid instruments. Of particular importance to this study is the construct validity of the measures of executive functioning. Ferrari, Johnson, and McCown (1995) reviewed Aitken's (1982) Time Use Questionnaire and reported it to be a psychometrically sound measure of academic procrastination for college students. As a result, there is little reason to suspect that procrastination has been poorly measured in this study. However, the issue of how to

effectively assess executive functioning has a long history of debate, the details of which are relevant to the findings of this study.

As reviewed earlier, executive functioning has been defined as having several components including the capacities for formulating goals, planning how to perform those goals, and carrying the goals out in an effective manner. These capacities are crucial for independent, creative, and socially constructive behavior (Lezak, 1982). Equally crucial is the ability to accurately measure those abilities that are critical to independent functioning. The effective assessment of executive functioning should help to identify which of the executive functioning components identified above may be dysfunctional.

Unfortunately, a paradox exists when trying to assess executive functioning ability (Lezak, 1995). There is a great deal of structure inherent in the typical psychological testing situation. The examiner determines what activity the subject will do and with what materials. The structure is not problematic in cognitive assessment, which seeks to determine how much knowledge, skill, or intellectual ability one has. Accordingly, psychology has a plethora of tools for identifying and making fine discriminations of cognitive functions such as memory, attention, or intelligence. In contrast, testing structure directly impedes the ability to measure executive functioning and to answer such questions as how a person goes about doing a task or whether it is done at all. Lezak (1982) poignantly puts it this way:

Questions dealing with executive functions ask how well a patient maintains a performance rate, how consistently and effectively he self-corrects, how

responsive is he to changes in the demands of the task, or does he start and stop activities by himself and if so, how appropriately, and so on (p. 282).

Obtaining the answers to these questions is not conducive to the typical assessment setting because while the examiner wants to be able to observe these abilities of executive functioning, the examination setting itself places the subject within a structured setting in which the examiner dictates what the subject is to do. Unfortunately, the executive functioning measures selected for this study are not immune from the paradox of trying to evaluate how participants structure themselves in a situation that is already structured for them. This dilemma was considered when selecting the COWAT, RFFT, and the TTT for this study. I attempted to select from the available measures those that seemed the least structured in addition to those that have been found to primarily represent pre-frontal cortex.

Another possible more productive approach to measure selection would have been to select one reputable test that corresponds to each of the 4 components of executive functioning. That would not have necessarily led to entirely different measures as the fluency measures used in this study are considered to be mainstream neuropsychological tests. However, the Tinkertoy Test is considered a relatively new measure of executive functioning, which has not been extensively used either clinically or in research.

In addition to the difficulty of evaluating executive functioning ability, the issues of response bias and sex differences may have contributed to the unexpected findings of this study. When recruiting for the academic probation group, there was only a 5-10% response to the recruitment letters. In addition, 60% of the subjects who did respond

failed to complete participation for a variety of reasons, e.g. not showing up at arranged time, not returning phone calls. As a result, the sample obtained likely represents the “best” of those on academic probation. It can be argued that the obtained sample is the higher functioning individuals of the entire academic probation population. It is reasonable to question whether the 90% who did not respond to the recruitment letter are different in important ways including executive functioning. Did they choose not to participate because they were not interested or was it possibly because they were too disorganized to fit anything else into their days. The non-participants may have reported similar levels of procrastination as the sample obtained, however, they may do so for the reasons predicted in this study. Future research would be best served by expending the time and effort to capture a larger percentage of students on academic probation.

There was also some potentially important sex differences in the academic probation group. Women appear to be slightly over-represented in the academic probation group. In the current study, women represented 57% of the subjects on academic probation, which is higher than the 43.9% and 45.8% reported by LCC and GCC respectively. This finding suggests that women were more willing than men to participate in the current study. The reasons for this difference can only be speculated. Perhaps this volunteer bias could indicate that women, in general, are more willing to be helpful to others in need. It could also suggest that the women were more concerned about their probation status and believed that participation would somehow be beneficial to them. This explanation becomes more feasible when recalling that the stated purpose of the study was to “investigate factors that interfered with the timely completion of community college.” Women were also over-represented in the control group, as only

29% of the control group were male. The issues of response bias and sex differences are important sampling considerations for future research.

The results obtained in this research were surprising, particularly when considered in the light of the anecdotal information obtained during data collection. Time was spent debriefing subjects after their participation was completed. When asked to explain why they were having difficulty managing the demands of college they would consistently comment that they were at a loss to specifically explain what happened. Some subjects stated that they felt like they knew what they had to do but would have difficulty getting things organized to do it. Others stated that there was simply too much for them to keep up with and that going to college was much harder than they expected. A smaller group of subjects said they had no idea of what the problem was and that they weren't sure why they were going to college.

On a behavioral level, the tremendous difficulties (i.e. no shows, late arrivals) that this researcher had in getting the subjects to follow through with participation also seemed to be suggestive of the kind of disorganization that seemed to be of epidemic proportions with the subjects on academic probation. However, each of these individuals who were struggling to the point of being on probation and who were verbalizing problems that seemed to be of an executive functioning nature, were able to sit down in the structured test situation and perform satisfactorily. Lezak (1982) suggests that evaluating executive capacities by means of interviews, observation, improvised assessment techniques, and standardized test will usually "bring to light executive dysfunctions that may not have become evident in the usual clinical examination." (p. 285).

Nevertheless, what conclusions are to be drawn from this study? Results strongly suggest that the severe procrastinators in this study do not as a group suffer from deficient executive functioning ability. What then accounts for the significantly higher levels of procrastination that the AP group evidenced? Unfortunately, this study offers little direction as to the possible reasons for their procrastination. From this study we do know that the 2 groups have comparable intellectual abilities. We also know that the AP group does not represent a group of individuals who are more clinically depressed or have a higher incidence of learning disabilities. An educated guess would be that the severe and chronic procrastinators in the AP group are very heterogeneous and are likely to share the same cognitive, affective, and behavioral correlates identified in the review of the procrastination literature. In truth, this is an empirical question because the procrastinators in this study were selected very differently than the prototypical procrastination sample. It may be that severe procrastinators have similar but more extreme profiles of cognitive, affective, and behavioral factors established in the literature. It may also be that entirely different variables are leading to clinical levels of procrastination.

It would be short sighted to conclude, from the results of this exploratory study, that neuropsychological variables are not involved in procrastination. Given the small sample size employed as well as the difficulties inherent in measuring executive functioning, further research in this area is needed. In my opinion that the lack of power inherent in this study is not responsible for the unexpected results. Rather, further thought needs to be invested in finding better instruments or more effective methods for evaluating a person's ability to formulate goals, establish plans for meeting goals, and

executing those plans. The executive functioning measures selected for this study was selected because performance on those measures is primarily subserved by the frontal lobes of the brain. The rationale was to choose measures that were clearly frontal lobe measures and to choose measures that evaluated both left and right frontal cortex. Perhaps a more effective approach would have been to select instruments that corresponded to each of the 4 components of executive functioning described by Lezak (1983). For example, one component of executive functioning is planning ability. This ability can be evaluated by such measures as the Tower of London or Porteus Mazes. Organizational ability could be evaluated by copying a complex figure such as the one used in the Rey Complex Figure. It was my intention to more specifically explore which specific executive functioning abilities may be compromised for severe procrastinators if this exploratory study suggested a relationship between the two.

In summary, an attempt was made in this study to identify a viable research problem and develop testable questions and a set of hypotheses. An attempt was also made to establish a methodology that provided a reasonable chance of identifying those individuals who suffer from severe procrastination without contaminating the sample as to the true purpose of this study. A theoretical rationale for investigating neuropsychological factors in procrastination was presented along with its relevance to the field of counseling psychology. It is hoped that this study was successful in answering the questions posed as well as triggering further empirical interest to more definitively clarify neuropsychological variables in procrastination.

APPENDIX A

Recruitment Letter

Date:

Return address:

Dear _____,

I am writing to you about a special opportunity that I thought you may be interested in. Michigan State University has contacted me about a research study that they will be conducting. The purpose of the study is to learn about factors that interfere with students finishing community college in a timely manner. Your participation in this study involves you completing a few brief questionnaires and a short test battery of your thinking skills. You can complete your participation in 50 to 60 minutes. For your participation you will be paid \$10 at the end of the hour.

Your participation is completely voluntary. You are free to withdraw from the study at any time. Your participation in this study will be treated with strict confidence and you will not be personally identified in any of the results or test materials. Your academic counselor or myself will not have access to your test results or any of your questionnaire responses. In fact, I won't even know if you chose to participate. The results of this study and any additional information that you would like to know will be made available to you at your request. If you are interested in participating or have any other questions, please call David Stone at (517) 371-8530.

Sincerely,

Dr. John Cansfield

Director, Counseling Center

Note: This was the letter used for Lansing Community College. The same letter was used to recruit from Glendale Community College. The only changes were my phone number and the name of the Director of the counseling center. APPENDIX A

APPENDIX B

Client Information Sheet

- 1) Subject Number: _____
- 2) Sex: _____ 3) Age: _____
- 3) Ethnic Background e.g. Caucasian, African-American: _____
- 4) Length of time (Number of semesters) spent at Community College so far:

- 6) Credits completed to date: _____
- 7) Major: _____
- 8) Grade point average: _____
- 9) Are you or have you been on Academic Probation? _____
If yes, how many times? _____
- 10) Do you have a documented learning disability and if so what type?

- 11) Have you ever received special education services? _____
- 12) Have you ever had seizures? _____
- 13) Have you ever had a serious head injury? _____

APPENDIX B cont.

14) Do you feel as if you experience problems in school because of procrastination?

If yes, please explain in your own words how long it has been a problem and how severe you think it is?

APPENDIX C

Consent Form

The purpose of this study is to learn more about factors that interfere with students completing community college in a timely manner. I understand and agree to the following conditions:

1. I freely consent to participate in this study being conducted by David Stone, a graduate student in Counseling Psychology, under the supervision of Nancy Crewe, Ph.D., Professor of Psychology at Michigan State University. I understand that my participation is completely voluntary.
2. I understand that my participation will involve completing some questionnaires and a short battery of tests that will assess my thinking skills. These tests will ask me to answer questions, complete some paper and pencil tasks, and to assemble some objects. The total time to complete my participation is between 50 to 60 minutes.
3. I also understand that a photograph may be taken of an object that I assemble. The only identifying information in the photograph is an I.D. number.
4. I understand that my name (first name only) will only be known by David Stone and that it will be held in strict confidence. I further understand that my name will not appear on any questionnaires or test materials. In addition, I understand I will remain anonymous in any report of the research findings.
5. I understand that I may choose not to participate or choose to withdraw my participation at any time without penalty. **Your academic counselor will not have access to your test results or any of your questionnaire responses.**
6. I understand that I will receive a \$10 stipend as a result of my participation in this study.
7. I understand that if I have any questions or concerns that arise as a result of my participation in this study, I can contact David Stone at (517) 646-8007.

Signature _____

Date _____

APPENDIX D

TIME-USE QUESTIONNAIRE

Directions: This questionnaire will give information about your use of time and study behavior. There are no correct answers so please answer honestly. Please use the following scale to answer the statements below. Write the letter from the scale below in the space provided at the end of each statement.

A=True

B=Mostly
True

C=Cannot
Say

D=Mostly
False

E=False

1. I delay starting things until the last possible minute. _____
2. I am careful to return library books on time. _____
3. I often don't finish tasks on time. _____
4. I usually meet my own self-set deadlines. _____
5. Even when I know that a job needs to be done, I never want to start it right away. ____
6. I keep my assignments up to date by doing my work regularly from day to day. _____
7. If I have a number of jobs that need to be done by the end of the day, I usually get them done. _____
8. If there were a workshop offered that would help me learn not to put off starting my work, I would go.
9. I don't seem to know when I need to start a job to be able to get it done on time. ____
10. I am often late for appointments and meetings. _____
11. I use the vacant hours between classes to get a head start on my evening's work. _____
12. I delay starting things so long that I sometimes don't get them done by the deadline. _____
13. I overestimate the amount of work that I can do in a given amount of time. _____
14. I don't delay when I know that I really need to get a job done.
15. If I have an important project to do, I get started as soon as possible. _____
16. When I have a test scheduled soon, I often find myself working on other jobs instead of studying for the test. _____
17. I often finish my work well before it is due. _____
18. I get right to work at jobs that need to be done. _____
19. If I have an appointment, I make certain that the clothes I want to wear are ready the day before.

APPENDIX E

TTT Scoring Protocol (Taken from Malcolm, 1993):

Two sets of scores are derived from the subject's construction: number of pieces uses (TTT_{np}) and the total for the complexity score (TTT_{comp}).

1) TTT_{np} for the final construction can have a maximum value of fifty. It is unclear to the examiner whether certain combination of pieces are intended to be part of the finished construction, the subject should be asked about it. In general, any combination of pieces should be included in the final TTT_{np} score.

2) The TTT_{comp} score represents eight variables (see scoring sheet) with the highest possible score being 12 and the lowest possible score being a -1.

a) mc: Does the subject combine any pieces in the course of the construction (i.e. versus aimlessly manipulating pieces without putting any together)?

b) np: Identical to TTT_{np} with an ordinal scale.

c) name: Does the subject name the final construction?

d) mov: Does the final construction have freely moving parts; does it have mobility, i.e., functionally rolling wheels?

e) sym: Does the final construction have parallelism of design, i.e., either two facing sides corresponding in the arrangement of pieces (symmetry x 2), or two pairs of matching sides (symmetry x 4), although each pair can represent a different design.

f) 3D: Is the final construction three-dimensional (i.e., versus pieces lying flat on the surface of the table)?

g) stand: Is the entire final construction free-standing (i.e., versus pieces needing to be held up by hand or propped up by means of support other than by the construction itself)?

APPENDIX E cont.

h) error: As described above, this score refers to whether there were errors of misfit pieces, incomplete connections, or pieces that are dropped and not picked up.

APPENDIX F

THE TINKERTOY TEST

SUMMARY OF SCORES

Subject Number: _____

Date of Testing: _____

SCORES:

1. Number of pieces (TTT_{np}) = _____

2. Complexity Score (TTT_{comp}) = _____

Mc score either 1 or 0

Np score as follows: np less than or equal to 20 = 1 pts, np from 21 to 30 = 2 pts,
np from 31 to 40 = 3pts, 41 to 50 = 4 pts.

Name score 1 or 0

Move score 1 or 0 for mobility and 1 or 0 for moving parts. Max score = 2.

Sym score 0, 1 for symmetry X2, 2 for symmetry X4 Max score =2

3d score 1 or 0

stand score 1 or 0

error score -1 for one or more errors.

APPENDIX G

BECK DEPRESSION INVENTORY

This questionnaire consists of 21 groups of statements. After reading each group of statements carefully, circle the number (0,1,2,3) next to the one statement in each group which **best** describes the way you have been feeling the **past week, including today**. If several statements within a group seem to apply equally well, circle each one. **Be sure to read all the statements in each group before making your choice.**

1. 0 I do not feel sad.
 1 I feel sad.
 2 I am sad all the time and I can't snap out of it.
 3 I am so sad or unhappy that I can't stand it.

2. 0 I am not particularly discouraged about the future.
 1 I feel discouraged about the future.
 2 I feel I have nothing to look forward to.
 3 I feel that the future is hopeless and that things cannot improve.

3. 0 I do not feel like a failure.
 1 I feel I have failed more than the average person.
 2 As i look back on my life, all I can see is a lot of failure.
 3 I feel I am a complete failure as a person.

4. 0 I get as much satisfaction out of things as I used to.
 1 I don't enjoy things the way I used to.
 2 I don't get real satisfaction out of anything anymore.
 3 I am dissatisfied or bored with everything.

5. 0 I don't feel particularly guilty.
 1 I feel guilty a good part of the time.
 2 I feel quite guilty most of the time.
 3 I feel guilty all of the time.

APPENDIX G cont.

6. 0 I don't feel I am being punished.
1 I feel I am being punished.
2 I expect to be punished.
3 I feel I am being punished.
7. 0 I don't feel disappointed in myself.
1 I am disappointed in myself.
2 I am disgusted in myself.
3 I hate myself.
8. 0 I don't feel I am any worse than anybody else.
1 I am critical of myself for my weaknesses or mistakes.
2 I blame myself all the time for my faults.
3 I blame myself for everything bad that happens.
9. 0 I don't have any thoughts of killing myself.
1 I have thoughts of killing myself, but I would not carry them out.
2 I would like to kill myself.
3 I would kill myself if I had the chance.
10. 0 I don't cry any more than usual.
1 I cry more now than I used to.
2 I cry all the time now.
3 I used to be able to cry, but now I can't cry even though I want to.
11. 0 I am no more irritated by things than I ever am.
1 I am slightly more irritated now than usual.
2 I am quite annoyed or irritated a good deal of the time.
3 I feel irritated all the time now.
12. 0 I have not lost interest in other people.
1 I am less interested in other people than I used to be.
2 I have lost most of my interest in other people.
3 I have lost all of my interest in other people.

APPENDIX G cont.

13. 0 I make decisions about as well as I ever could.
1 I put off making decisions more than I used to.
2 I have greater difficulty in making decisions than before.
3 I can't make decisions anymore.
14. 0 I don't feel that i look any worse than I used to.
1 I am worried that I am looking old or unattractive.
2 I feel that there are permanent changes in my appearance that make me look unattractive.
3 I believe that I look ugly.
15. 0 I can work about as well as before.
1 It takes an extra effort to get started at doing something.
2 I have to push myself very hard to do anything.
3 I can't do any work at all.
16. 0 I can sleep as well as usual.
1 I don't sleep as well as I used to.
2 I wake up 1-2 hours earlier than usual and find it hard to get back to sleep.
3 I wake up several hours earlier than I used to and cannot get back to sleep.
17. 0 I don't get more tired than usual.
1 I get tired more easily than I used to.
2 I get tired from doing almost anything.
3 I am too tired to do anything.
18. 0 My appetite is no worse than usual.
1 My appetite is not as good as it used to be.
2 My appetite is much worse now.
3 I have no appetite at all anymore.
19. 0 I haven't lost much weight, if any, lately.
1 I have lost more than five pounds.
2 I have lost more than ten pounds.
3 I have lost more than fifteen pounds

APPENDIX G cont.

20. 0 I am no more worried about my health than usual.
1 I am worried about physical problems such as aches and pains, or upset stomach, or constipation.
2 I am very worried about physical problems and it's hard to think of much else.
3 I am so worried about my physical problems that I cannot think about anything else.
21. 0 I have not noticed any recent changes in my interest in sex.
1 I am less interested in sex than I used to be.
2 I am much less interested in sex now.
3 I have lost interest in sex completely.

Interpreting the Beck Depression Inventory

Add up the score for each of the twenty-one questions and obtain the total. Scores will range from zero to sixty-three.

<u>Total Score</u>	<u>Levels of Depression</u>
1-10	Normal ups and downs
11-16	Mild mood disturbance
17-20	Borderline clinical depression
21-30	Moderate depression
31-40	Severe depression
over 40	Extreme depression

APPENDIX H

WENDER UTAH RATING SCALE

AS A CHILD I WAS (OR HAD)	Not at all or very slightly	Mildly	Moderately	Quite a Bit	Very Much
1. Concentration problems, easily distracted					
2. Anxious, worrying					
3. Nervous, fidgety					
4. Inattentive, daydreaming					
5. Hot or short tempered, low boiling point					
6. Temper outbursts					
7. Trouble with stick-to-it-iveness, not following through, failing to finish things started.					
8. Stubborn, strong willed					
9. Sad or blue, depressed, unhappy					
10. Disobedient with parents, rebellious, sassy					
11. Low opinion of myself					
12. Irritable					
13. Moody, haves ups and downs					
14. Angry					
15. Acting without thinking, impulsive					
16. Tendency to be immature					
17. Guilty feelings, regretful					
18. Losing control of myself					
19. Tendency to be or act irrational					
20. Unpopular with other children, didn't keep friends for long,					
21. Trouble seeing things from someone else's view					
22. Trouble with school, visits to principal's office					
23. Overall a poor student, slow learner					
24. Trouble with mathematics or numbers					
25. Did not achieve up to potential					
	x 0	x 1	x 2	x 3	x 4

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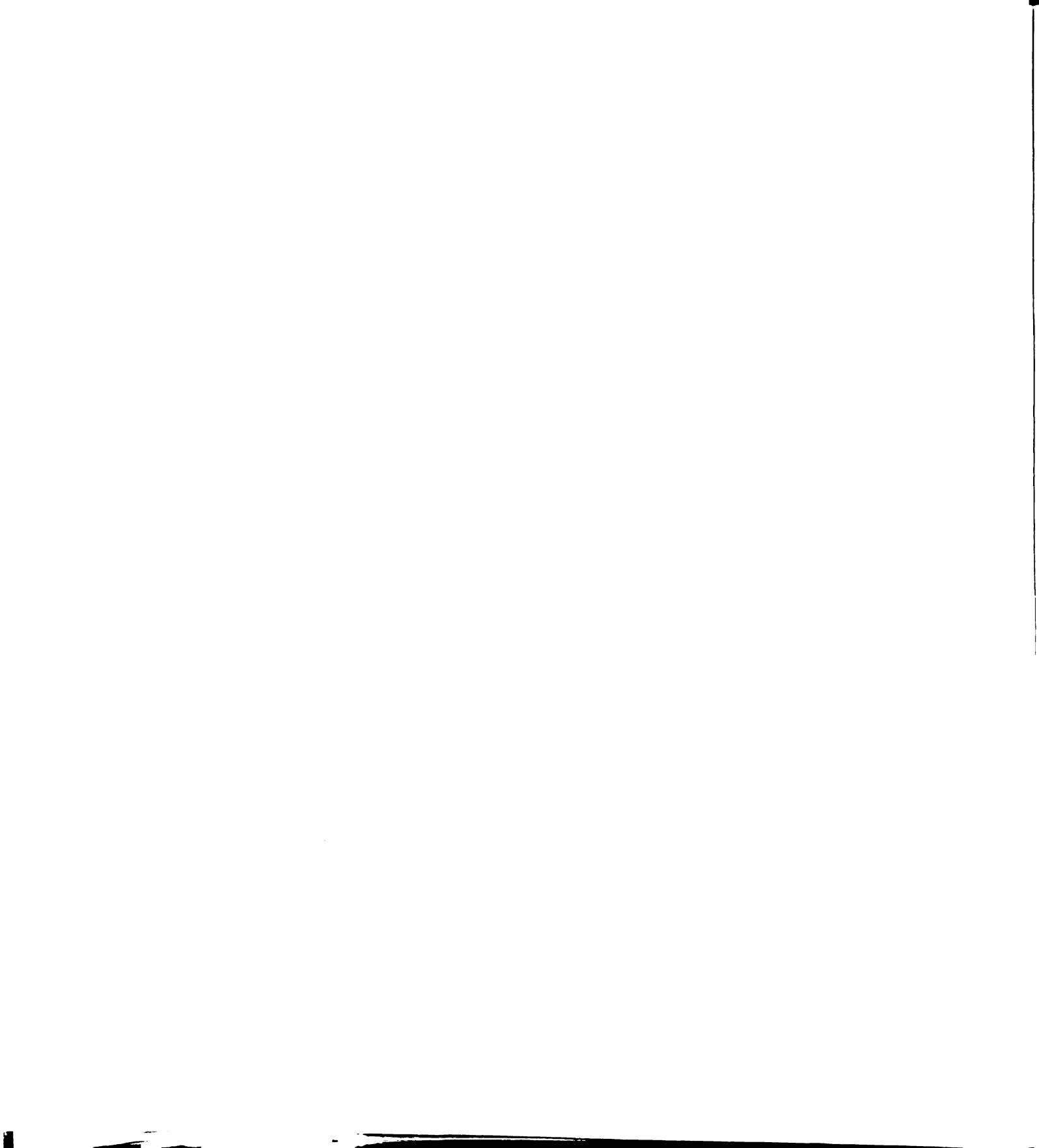
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