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The Nature of Procrastination: A Meta-Analytic and Theoretical Review of Quintessential Self-Regulatory Failure

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Abstract

Procrastination is a prevalent and pernicious form of self-regulatory failure that is not entirely understood. Hence, the relevant conceptual, theoretical, and empirical work is reviewed, drawing upon correlational, experimental, and qualitative findings. A meta-analysis of procrastination's possible causes and effects, based on 691 correlations, reveals that neuroticism, rebelliousness, and sensation seeking show only a weak connection. Strong and consistent predictors of procrastination were task aversiveness, task delay, self-efficacy, impulsiveness, as well as conscientiousness and its facets of self-control, distractibility, organization, and achievement motivation. These effects prove consistent with *Temporal Motivation Theory*, an integrative hybrid of expectancy theory and hyperbolic discounting. Continued research into procrastination should not be delayed, especially since its prevalence appears to be growing.

Keywords: Procrastination, irrational delay, pathological decision-making, meta-analysis

The Nature of Procrastination: A Meta-Analytic and Theoretical Review of Quintessential Self-Regulatory Failure

Procrastination is extremely prevalent. Although virtually all of us have at least dallied with dallying, some have made it a way of life. Estimates indicate that 80% to 95% of college students engage in procrastination (Ellis & Knaus, 1977; O'Brien, 2002), approximately 75% consider themselves procrastinators (Potts, 1987), and almost 50% procrastinate consistently and problematically (Day, Mensink, & O'Sullivan, 2000; Haycock, 1993; Micek, 1982; Onwuegbuzie, 2000a; Solomon & Rothblum, 1984). The absolute amount of procrastination is considerable, with students reporting that it typically occupies over one third of their daily activities, often enacted through sleeping, playing or TV watching (Pychyl, Lee, Thibodeau, & Blunt, 2000). Furthermore, these percentages appear to be on the rise (Kachgal, Hansen, & Nutter, 2001). In addition to being endemic during college, procrastination is also widespread in the general population, chronically affecting some 15-20% of adults (Harriott & Ferrari, 1996; "Haven't Filed Yet," 2003).

Procrastination also appears to be a troubling phenomenon. People most strongly characterize it as being bad, harmful, and foolish (Briody, 1980), and over 95% of procrastinators wish to reduce it (O'Brien, 2002). Justifying this viewpoint, several studies have linked procrastination to individual performance, with the procrastinator performing more poorly overall (Beswick, Rothblum, & Mann, 1988; Steel, Brothen, & Wambach, 2001; Wesley, 1994); and to individual well-being, with the procrastinator being more miserable in the long-term (Knaus, 1973; Lay & Schouwenburg, 1993; Tice & Baumeister, 1997). For example, a survey by H&R Block indicates that procrastinating on taxes costs people on average \$400 due to rushing and consequent errors, resulting in over \$473 million dollars in overpayments in 2002 (Kasper,

2004). Similarly, the medical field reports that procrastination on the part of patients is a major problem (e.g., Morris, Menashe, Anderson, Malinow, & Illingworth, 1990; White, Wearing, & Hill, 1994); this is also reflected in the meta-analytic work of Bogg and Roberts (2004).

A variety of other fields repeat this theme, that procrastination is dangerous. In economics, Akerlof (1991) and O'Donoghue and Rabin (1999) consider the relative lack of retirement savings behavior as a form of procrastination, where many start preparing for their later years far too late. In the political arena, procrastination has been used to describe both Presidential decisions (Farnham, 1997; Kegley, 1989) and the banking practices of nations (Holland, 2001), in which important decisions are disastrously delayed. At larger levels of analysis, Gersick (1989) describes how teams consistently delay the bulk of their work until deadlines approach.

Unfortunately for such an extensive and potentially harmful phenomenon, much has yet to be learned about the causes of procrastination, although there have been some notable reviews. Ferrari, Johnson, and McCown's (1995) book on the topic is extensive but focuses primarily on measurement and theory, with less emphasis on empirical findings. On the other hand, van Eerde (2003) did conduct a meta-analysis on procrastination; although statistically solid, it is also limited in scope. Based on 88 articles, it does not incorporate environmental variables (e.g., task effects) or non-correlational findings (e.g., experimental or survey results), does not consider several personality facets (e.g., extraversion or impulsiveness) or theoretical foundations, and does not include a moderator search or account for attenuation effects. Finally, a book by Schouwenburg, Lay, Pychyl, and Ferrari (2004) reviews the topic but focuses primarily on technical expositions of procrastination treatment programs for academic counselors.

Consequently, there is a need for a comprehensive and detailed examination of the research on procrastination. With such a review, we can better elucidate the nature of procrastination, understanding when and why it occurs as well as how to prevent it. The goal of this paper, then, is threefold. The first goal is to establish the nature of procrastination conceptually. Exactly what is it that we are examining? This step involves integrating the many different descriptions of procrastination into a single coherent definition, showing that this definition is consistent with the history of procrastination, and then placing procrastination among related concepts.

With this conceptual foundation, the second goal is to explore broadly the causes and correlates of procrastination, that is, to establish its nomological web. These relationships are subsequently tested through meta-analytic review and consideration of relevant descriptive and experimental studies. Finally, these necessarily wide-ranging results need to be integrated. The findings are evaluated with respect to *Temporal Motivation Theory* (Steel & König, in press), a recent integrative motivational model that seeks to explain self-regulatory behavior in a way that is consistent with a wide variety of theoretical perspectives (e.g., economics, personality, expectancy theory, goal setting).

Definition of Procrastination

Procrastination is occasionally used in a positive sense. Several writers have mentioned it as a functional delay or as avoiding *rush* (e.g., Bernstein, 1998; Chu & Choi, 2005; Ferrari, 1993b). For example, Bernstein (1998) explains: “Once we act, we forfeit the option of waiting until new information comes along. As a result, no-acting has value. The more uncertain the outcome, the greater may be the value of *procrastination* [italics added]” (p. 15). However, the

positive form of procrastination, as the subsequent historical analysis indicates, is secondary in usage. The focus of this paper is on the primary, negative form of procrastination.

Like many common-language terms drafted into scientific study, definitions for procrastination tend to be almost as plentiful as the people researching this topic (see Ferrari et al., 1995). Initially, such definitional variation may seem to obscure the nature of procrastination, but it may also serve partially to illuminate it. Different attempts to refine our understanding can be complementary rather than contradictory. In addition, any common theme likely reveals a core or essential element. It is evident that all conceptualizations of procrastination recognize that there must be a postponing, delaying, or putting off a task or a decision, in keeping with the term's Latin origins of "pro," meaning "forward, forth, or in favor of," and "crastinus," meaning "of tomorrow" (Klein, 1971).

Building on this base, we procrastinate when we delay beginning or completing an *intended* course of action (Beswick & Mann, 1994; Ferrari, 1993a; Lay & Silverman, 1996; Milgram, 1991; Silver & Sabini, 1981). This is a useful distinction, as there are thousands of potential tasks that we could be doing at any time, and it becomes cumbersome to think that we are putting them all off. The distinction also separates procrastination from simple decision avoidance (Anderson, 2003), where people's original intention *is* to delay.

In addition, procrastination is most often considered to be the *irrational* delay of behavior (Akerlof, 1991; Burka & Yuen, 1983; Ellis & Knaus, 1977; Silver & Sabini, 1981), which reflects the dictionary definition: "defer action, especially without good reason" (Oxford English Reference Dictionary, 1996). Being irrational entails choosing a course of action despite expecting that it will not maximize your utilities, that is your interests, preferences, or goals of both a material (e.g., money) and a psychological (e.g., happiness) nature. Combining these

elements suggests that to procrastinate is to voluntarily delay an intended course of action despite expecting to be worse off for the delay.

History of Procrastination

Readers interested in the history of procrastination might seek a book by Ringenbach (1971), cited by Knaus (1979), but this search is not recommended. Aitken's (1982) investigation reveals that the work was never actually written. Her correspondence with Paul Ringenbach and the publisher reveals that it was actually an elaborate joke (i.e., a book on procrastination that was never completed). See also Kaplan (1998) for a similar well-conducted academic article/prank on procrastination (i.e., note the reference to the Stilton and Edam authors who "researched" using cheese to assess procrastination in mice). The first actual historical analysis on procrastination was written by Milgram (1992), who argues that technically advanced societies require numerous commitments and deadlines, which give rise to procrastination. Consequently, undeveloped agrarian societies are not so afflicted. In their book, Ferrari et al. (1995) take a similar although softened stand. They contend that procrastination has existed throughout history but that it only acquired truly negative connotations with the advent of the industrial revolution (circa 1750). Before then, procrastination was viewed neutrally and could be interpreted as a wise course of (in)action. On balance, there may be some truth to the notion that procrastination is a modern malady, as self-reports of procrastination indicate that it may be on the rise (Kachgal et al., 2001). Despite this increase, historical references indicate that our views about procrastination have been reasonably constant over the ages: it is and has long been a prevalent problem.

Starting from the Industrial Revolution, Samuel Johnson (1751) described procrastination as "one of the general weaknesses, which, in spite of the instruction of moralists, and the

remonstrances of reason, prevail to a greater or less degree in every mind.” A contemporary of Johnson, Phillip Stanhope (1749), Earl of Chesterfield, advised, “No idleness, no laziness, no procrastination; never put off till tomorrow what you can do today.”

Clearly preceding the Industrial Revolution was a sermon written by a Reverend Walker (1682), who made it quite clear that procrastination is extremely sinful, that he and other ministers had rallied their congregations against it repeatedly, and that other texts were available that spoke similarly.¹ John Lyly, an English novelist patronized by Queen Elizabeth I, was known for his 1579 work *Eupheus*, a book that relied heavily on proverbs for its content. In it Lyly noted, “Nothing so perilous as procrastination” (1579/1995).

A search of classical texts yields several illuminating references to the nature of procrastination. In 44 BC, Cicero was the consul of Rome, its highest political office, and an infamous orator who spoke against several political opponents, such as Marcus Antonius (i.e., Mark Antony), who later had Cicero killed. In one of a series of speeches denouncing Antonius, Cicero stated, “In the conduct of almost every affair slowness and procrastination are hateful” (*Philippics*, 6.7). Roughly 400 years earlier, Thucydides also wrote about procrastination. An Athenian general who wrote extensively on the war with the Spartans, including various aspects of personalities and strategies, Thucydides mused that procrastination is the most criticized of character traits, useful only in delaying the commencement of war so as to allow preparations that speed its conclusion (*Histoires*, 1.84.1). Finally, writing around 800 BC, Hesiod, one of the first recorded poets of Greek literature, provides one of the earliest possible citations. His words are worth repeating in full:

Do not put your work off till to-morrow and the day after; for a sluggish worker does not fill his barn, nor one who puts off his work: industry makes work go well, but a man who puts off work is always at hand-grips with ruin. (*Works and Days*, l. 413)

The *Bhagavad Gita* provides an additional Eastern reference. Written in approximately 500 BC, it is considered the most widely read and influential spiritual text of Hinduism (Gandhi, Strohmeier, & Nagler, 2000). Within it, Krishna maintains: “Undisciplined, vulgar, stubborn, wicked, malicious, lazy, depressed, and procrastinating; such an agent is called a Taamasika agent” (18.28). Of special note, Taamasika people are considered so lowly that mortal rebirth is denied to them; rather, they go to hell.

Given this consistency of opinion, stretching thousands of years, procrastination must be considered an almost archetypal human failing. Therefore it is rather surprising and ironic that science did not address procrastination sooner.

Procrastination as a Personality Trait

Whether procrastination can also be considered a trait is an empirical question: Does people’s level of procrastination show consistency across time and situation? There has been sufficient research to address this issue, and it suggests procrastination has sufficient cross-temporal and situational stability. To begin with, there appears to be a biological or genetic component to procrastination. A recent study by Arvey, Rotundo, Johnson, and McGue (2003) asked 118 identical and 93 fraternal male twins reared in the same family to indicate the degree to which they were a “procrastinator.” The intraclass correlations for this item were .24 for identical twins, and .13 for the fraternal twins, suggesting that approximately 22% of the variance on this item was associated with genetic factors.² Nine short-term studies ($N = 928$) were located that had test-retest reliability data. After an average span of 42 days between

assessments, the average correlation was .73. In addition, Elliot (2002) managed to obtain long-term test-retest data for 281 participants who took the Adult Inventory of Procrastination. With a hiatus of 10 years, the correlation was .77, a further indication that procrastination is sufficiently stable to be a trait.

Given that procrastination reflects personality, the focus then moves to where it fits in the nomological web, particularly the five-factor model. Conceptually, there is also considerable overlap with conscientiousness. For example, Costa and McCrae's (1992) self-discipline scale, a facet of conscientiousness, contains several items strongly reminiscent of procrastination itself (e.g., "I waste a lot of time before settling down to work."). Similarly, Schouwenburg (2004) concludes:

Various studies show a very distinct clustering of related traits: trait procrastination, weak impulse control, lack of persistence, lack of work discipline, lack of time management skill, and the inability to work methodically. In this constellation, there seems little justification for viewing procrastination as a separate trait. It is possibly more fruitful to label this cluster as (lack of) self-control. (p. 8)

Despite this overlap, conscientiousness is a broader construct. It has been defined with terms as varied as conformity, socially prescribed impulse control, achievement orientation, cautiousness, morality, organization, thoroughness, and reliability (Costa, McCrae, & Dye, 1991; Goldberg, 1993; Hogan & Ones, 1997). Recent work by Parish (2004) as well as Roberts, Chernyshenko, Startk, and Goldberg (2005) has tried to clarify the nature of conscientiousness with focused exploratory and confirmatory factor analyses along with criterion validation. In each case, a comprehensive list of conscientiousness-related items was administered to over 700 participants, revealing that the conscientiousness trait is composed of as many as six factors.

From both of these lists, the first major factor best represents procrastination. For the work of Roberts et al., the first major factor is labeled *Industriousness* and represents rationality, efficiency, and hard work. For Parish, the factor is labeled *Responsibility* and its connection to procrastination is explicit; it is defined as the “The Diligent Fulfillment of Objectives.” Furthermore, Responsibility (i.e., procrastination) also has the most uniformly strong association with workplace deviance and academic performance. Consequently, procrastination may be considered to be the most central facet of conscientiousness, but it is not conscientiousness itself.

The Causes and Correlates of Procrastination

The amount of empirical work that has been done on procrastination is considerable. Researchers have been prolific in exploring different possible connections and correlates. This body of work is ideal in establishing procrastination’s nomological web, but summarizing this extensive body of work is a challenge. Initially, the results are divided into four major sections: Task Characteristics, Individual Differences, Outcomes, and Demographics. Task Characteristics indicate possible environmental causes of procrastination. The Individual Differences section deals with relevant personality traits and is organized into the traditional five-factor model. Outcomes indicate the proximal effects of procrastination. Finally, the Demographics section reviews possible physical and cohort moderators. Each section is then subdivided into more specific constructs, which are reviewed along with their relevant theory. The relationships covered are then subsequently considered in the meta-analytic review.

Task Characteristics

Procrastination involves the voluntary choice of one behavior or task over other options. Consequently, we cannot irrationally delay all our tasks, but simply favor some over others. Unless we procrastinate randomly, the nature of the task itself must then have some effect upon

our decisions. True to this conclusion, in Briody's (1980) study, about 50% of people responded that their procrastination was due to some task characteristic. Two predictable environmental factors have been suggested: timing of rewards and punishments, and task aversiveness.

Timing of Rewards and Punishments

It has long been observed that the further away an event is temporally, the less impact it has upon our decisions (e.g., Lewin, 1935). Ainslie (1975) gives a historical account of this phenomenon from a predominantly psychological perspective under the rubric of *impulsiveness*, while Loewenstein (1992) traces its roots from a predominantly economic standpoint in terms of *temporal discounting*. Support for this effect is bountiful, with sufficient research to place it formally as one of the psychological laws of learning (Schwartz, 1989) or the dominant economic model of intertemporal choice or discounted utility (Loewenstein & Elster, 1992). Given this foundation, it is not surprising that it has also been used to explain procrastination.

In his essay on procrastination, Samuel Johnson (1751) posits temporal proximity as a cause in that it is natural "to be most solicitous for that which is by its nearness enabled to make the strongest impressions." More recently, this preference for the present has been resurrected by O'Donoghue and Rabin (1999), who used the economic discounted utility model to describe various forms of human procrastination, such as our tendency to save inadequately for retirement.

Task Aversiveness

Task aversiveness is almost a self-explanatory term. Also known as dysphoric affect (Milgram, Sroloff, & Rosenbaum, 1988) or task appeal (Harris & Sutton, 1983), it refers to actions that we find unpleasant. Its relationship is predictable. By definition, we seek to avoid aversive stimuli, and consequently, the more aversive the situation, the more likely we are to

avoid it (e.g., procrastinate). Although the extent to which we dislike a task may be influenced by a variety of personal characteristics (e.g., boredom proneness, intrinsic motivation), if we do find the task unpleasant, research indicates that we are indeed more likely to put it off. Of note, task aversiveness needs the previous concept, the timing of rewards and punishment, to account for procrastination. By itself, it primarily predicts only task avoidance, not task delay.

Individual Differences

Attempts to specify the relationship between procrastination and individual differences have been abundant. To help organize the suspected correlates, traits are organized into the traditional five-factor model (Digman, 1990). Still, several researchers have focused their work on a single facet of a trait, such as impulsiveness. Since the field of personality lacks definitive terminology *at the facet level* (John & Sanjay, 1999), this situation generates an unwieldy number of relationships and creates some confusion about what facets should be associated with any specific trait. To reduce redundancy and illuminate potential patterns, facets that share a similar theoretical association with procrastination are grouped for discussion.

Consequently, results are clustered into the following groups. *Neuroticism* is considered along with four of its facets: I) Irrational Beliefs, II) Self-Efficacy & Self-Esteem, III) Self-Handicapping, and IV) Depression. Similarly, the trait *Extraversion* is reviewed along with three of its facets: I) Positive Affect, II) Impulsiveness, and III) Sensation Seeking. *Agreeableness* is considered only at the trait level, as is *Openness to Experience*, although *Intelligence/Aptitude* is also discussed alongside it but analyzed separately. Finally, *Conscientiousness* is considered along with several constructs related to self-regulation: I) Distractibility, II) Organization, III) Achievement Motivation, and IV) Intention-Action Gap.

Neuroticism

Similar in etiology to task aversiveness, neuroticism has also been explored as a source of procrastination. Neuroticism is very similar to worrying, trait anxiety, or negative affect.

Typically, researchers argue that if people procrastinate on tasks because they are aversive or stressful, then those who are more susceptible to experiencing stress should procrastinate more (e.g., Brown, 1991; Burka & Yuen, 1983; Ellis & Knaus, 1977). Consequently, the highly anxious, who can find cataclysmic interpretations in benign events, should be irrationally putting off many of life's large and little duties.³

Irrational beliefs.

Irrational belief, cognition, or thought is a broad term that includes several dysfunctional or anxiety-provoking worldviews. Ellis (1973) characterizes them as (1) almost certainly hindering the pursuit of happiness and fulfillment of desires, and (2) almost completely arbitrary and not amenable to proof or disproof. Since these beliefs create anxiety, their relationship to procrastination is similar to that of neuroticism; they make certain tasks increasingly unpleasant. Aitken (1982) explains:

The higher the possibility of rejection (real or imagined), the more likely it is that the individual will experience anxiety as he approaches the task. Since even thinking about the project evokes feeling of anxiety, the procrastinator starts an alternate task or distraction. (p. 32)

Of all possible irrational beliefs, Knaus (1973) argues that only two are closely related to procrastination: believing oneself to be inadequate, and believing the world to be too difficult and demanding. Researchers have followed in Ellis's (1973) and Knaus's (1973) footsteps by investigating among procrastinators the prevalence of irrational beliefs as well as four specific

manifestations. Particularly close attention has been paid to fear of failure, perfectionism, self-consciousness, and evaluation anxiety, all reasons related to worry about receiving harsh appraisal (Beck, Koons, & Milgrim, 2000; Burka & Yuen, 1984; Ellis & Knaus, 1977; Schlenker & Weigold, 1990).

Low self-efficacy and low self-esteem.

As fear of failure was associated with neuroticism, so it is connected with both low self-efficacy and low self-esteem (Ellis & Knaus, 1977). Specifically, people suffering from irrational beliefs may doubt their ability to do well (i.e., low self-efficacy) and believe that any failure to perform to standard suggests inadequacy as a person (i.e., low self-esteem). Independent of fear of failure, self-efficacy and self-esteem have also been argued to have direct links to procrastination and performance (Bandura, 1997; Burka & Yuen, 1983; Judge & Bono, 2001).

Self-handicapping.

Procrastinators may feel that their actions will not change their situation, and thus they concentrate instead on managing their emotional reactions to the situation. Consequently, to cope, they tend to use an emotion-oriented rather than a task-oriented style (Berzonsky, 1992; Flett, Blankstein, & Martin, 1995). A particularly well researched form of this emotion-focused, dysfunctional self-regulation is self-handicapping, that is, placing obstacles that hinder one's own good performance. The motivation for self-handicapping is often to protect one's self-esteem by giving oneself an external reason, an "out," if one fails to do well (Jones & Berglas, 1978; Smith, Snyder, & Handelsman, 1982). Self-handicapping is also associated with a diffuse/avoidant identity style (Berzonsky, 1992), a personality type that seeks to avoid relevant information about oneself.

From a conceptual standpoint, however, it is debatable whether self-handicapping could potentially cause or reflect procrastination. As Brown and Marshall (2001) discuss, an honest attempt at the task for people with low self-efficacy and self-esteem promises the gain of a little pride if they succeed, although at the risk of significant shame and humiliation if they fail. Given their “bounded” although perhaps faulty worldview, it is to their benefit not to make an unambiguous bid at succeeding. Their “procrastination” is then done purposefully, to maximize their overall utility, and should not be considered an irrational delay. Given that this is a nuanced point, delays due to procrastination or to self-handicapping should be behaviorally similar, and we can expect them to be empirically related.

Depression.

Depression, low energy, learned helplessness, and pessimism are closely related to each other and to neuroticism, irrational beliefs, and low self-efficacy or self-esteem. Beck (1993), for example, describes depression as being due to irrational beliefs that result in pessimism and self-dislike. Similarly, several studies have shown that neuroticism greatly increases susceptibility to depression (Ruiz-Caballero & Bermudez, 1995; Saklofske, Kelly, & Jansen, 1995). Costa and McCrae (1992) go so far as to include depression as a facet of neuroticism in their personality scale. Several researchers argue that learned helplessness and pessimism are strongly connected to depression, both theoretically and empirically (Abramson, Metalsky, & Alloy, 1989; Peterson, Colvin, & Lin, 1992). In addition, McCown, Johnson, and Petzel (1989) conducted a principal components analysis on several psychological inventories administered to a group of procrastinators. They found that depressed affect, neuroticism, and diminished feelings of control over the situation tended to load together, indicating that collectively they could represent at least one of the causes of procrastination.

Clinical depression has several characteristics that make it a likely suspect for causing procrastination. Depressed people are often unable to take pleasure in life's activities, tend to lack energy, and have problems concentrating (*DSM-IV*, 1994), all symptoms that make task completion difficult. The Beck Depression Inventory (Beck & Beck, 1972) even includes an item reminiscent of procrastination: "I put off making decisions more than I used to." As energy wanes, working apparently becomes painful or more difficult (Baumeister, Heatherton, & Tice, 1994). Burka and Yuen (1983) also discuss the fact that, when we are tired, it is harder to initiate tasks.

Openness to Experience: Intelligence/Aptitude

Openness to experience is sometimes referred to as culture, intellect, or need for cognition. As McCrae (1996) describes it, "Openness is a broad and general dimension, seen in vivid fantasy, artistic sensitivity, depth of feeling, behavioral flexibility, intellectual curiosity, and unconventional attitudes" (p. 323). Also, of the big-five personality traits, openness shows the strongest relationship with intelligence and scholastic aptitude (Beier & Ackerman, 2001), which are consequently summarized here. No direct relationship has yet been posited between openness or intelligence and procrastination, and accordingly, none is expected.

Agreeableness

According to the clinical literature (Burka & Yuen, 1983; Knaus, 1979), rebelliousness, hostility, and disagreeableness are thought to be major motivations for procrastination. Those with these personality traits are more likely to experience externally imposed schedules as aversive and thus to avoid them. By delaying work and starting it on one's own schedule, one also reasserts one's autonomy. The possibility of this etiology has led to the development of paradoxical treatments; for example, people are directed to procrastinate and, when they rebel

against this directive, they start work early (e.g., Mulry, Fleming, & Gottschalk, 1994; Shoham-Salomon, Avner, & Neeman, 1989).

Extraversion

Extraversion is one of the more interesting possible causes of procrastination, but also one of the more complicated. Extraverts are usually described as sociable, optimistic, outgoing, energetic, expressive, exciting, and impulsive (Brand, 1997; Guilford, 1977). Note that the exact definition of impulsiveness and its structure wanders somewhat, as well as which personality trait it best represents (Revelle, 1997). Typically, impulsiveness indicates spontaneity and a tendency to act upon whims and inclinations.

Some aspects of extraversion have already been discussed. Although pessimism and low energy level are aspects of depression, they are also a central part of extraversion, especially as measured by positive emotionality or affect (Watson & Clark, 1997). These preliminary findings demonstrate some of the complexities of extraversion as procrastination's hypothesized relationships with these facets conflict. Both lethargy and impulsiveness are expected to predict procrastination, but lethargy indicates a lack of extraversion, while impulsiveness suggests an abundance of the trait. In keeping with this inconsistency, no significant results are expected for extraversion.

Impulsiveness.

Where trait anxiety is perceived as representing the "behavioral inhibition system" or BIS, impulsiveness is primarily seen as representing the "behavioral activation system" or BAS (Pickering, Corr, Powell, Kumari, Thornton, & Gray, 1997). The BAS acts to motivate people in their pursuit of rewarding experiences and is a necessary cognitive component for proper

functioning. However, an overactive BAS should result in characteristics such as rapid decision-making and shorter attention spans, which in turn may increase procrastination.

Impulsive people may be more likely to procrastinate, as they are likely beset with desires of the moment and focus their attention upon them (Blatt & Quinn, 1967). Given that thoughts of the future do not weigh heavily in their decisions, they often pursue immediate gratification, neglecting or ignoring longer-term responsibilities. Consequently, impulsiveness is similar to the construct of present time orientation.

Sensation seeking.

Sensation seeking, like impulsiveness, is also interpreted as the result of an overactive behavioral activation system. People high in this trait are easily bored and long for excitement, and thus they may intentionally put off work in order to feel the tension of working close to a deadline. Their delays may be more purposefully planned than those of the purely impulsive; thus the rationality of this strategy, and consequently whether it should be considered procrastination, is debatable. Feasibly, this tactic could actually add significant pleasure and increase performance (Revelle, 1997; Sommer, 1990); without it, work could become tedious and slogging. However, Ainslie (1992) argues that the habit of sensation seeking may also become addictive, resulting in ever-increasing delays as we begin to relish ever-increasing risks. Ultimately, sensation-seekers may find that their pleasure has been bought with substantially diminished performance and long-term regret.

Conscientiousness

As mentioned, procrastination is conceptually representative of low conscientiousness and self-regulatory failure. Consequently, it should show strong associations with these variables. However, several other constructs should also demonstrate substantive relationships.

Ideally, procrastination should be associated with distractibility, poor organization, low achievement motivation, and an intention-action gap. That each of these constructs represents low conscientiousness or self-regulatory failure is reviewed in the following, as well as their theoretical connection to procrastination.

Distractibility.

It has long been noted that attention is critical to self-control. Sigmund Freud (1923/1961) and William James (1890) speak to this point, and more recent prominent researchers such as Austin and Klein (1996), Simon (1994), and Kuhl (2000) maintain this view. By way of an explanation, Klinger (1996, 1999) indicates that changes in flow of thought are preceded by an emotionally arousing cue. Consequently, management of distracting cues could facilitate the prevention of procrastination so that one either fails to encode these cues or limits their processing so that they are not fully valued.

Organization.

Organization refers to ordering, structuring, and planning one's life. It is a key self-regulatory technique that can reduce procrastination in several ways. For example, organization may contribute to goal setting (Locke & Latham, 1990), gap reflection (Oettingen, 1996), or automatic habits that preclude the decision to do otherwise (Bargh & Barndollar, 1996).

Achievement motivation.

Another aspect of conscientiousness that should be strongly related to procrastination is achievement motivation. Those high in achievement motivation set more difficult goals for themselves and often enjoy performance for its own sake (Costa & McCrae, 1992; Spence & Helmreich, 1983). Achievement motivation may affect procrastination by making work intrinsically engaging and thus necessarily less aversive. However, it is important to note that

achievement motivation is not limited to intrinsic motivation, and it may incorporate extrinsic elements as well.

Intention-action gap.

The intention-action gap refers to the degree to which people follow up on their original work plans. Most procrastination researchers suppose that delaying is not only irrational but also unintentional (e.g., Silver & Sabini, 1981). They believe that procrastinators do not purposefully put off their chores, but do so to the contrary of their original intent – an “is” versus “ought” scenario. As van Hooft, Born, Taris, van der Flier, and Blonk (2005) summarize the issue, “If the delay in action were intended, we would not regard it to be procrastination. Therefore, trait procrastination can be viewed as a moderator in the relation between implementation intentions and behavior” (p. 244). Failing to act upon one’s intentions is quintessentially self-regulatory failure (Rachlin, 2000), almost the definition of low self-control.

Outcomes

To the degree that we are self-interested, self-regulatory failure is associated with diminished overall utility, in terms of both mood and performance. Conceptually, procrastination is strongly related to conscientiousness, which itself is consistently linked to better performance (Barrick & Mount, 2003; Hurtz & Donovan, 2000). Consequently, procrastinators should tend to be worse off, in terms of both how they feel and what they achieve. Each of these outcomes is discussed in more detail.

Mood

Procrastination has long been viewed as a way of temporarily evading anxiety that unfortunately becomes compounded when later faced (Mayers, 1946; Solomon & Rothblum, 1984). Thus procrastination may initially improve mood but should worsen it later. This opens

the possibility of a deviation-amplifying loop, specifically a depression spiral (Lindsay, Brass, & Thomas, 1995). Given that depression may lead to procrastination and can be characterized as *extended* period of negative affect, a poor mood may itself may not only result from procrastination, but also create it.

Performance

Although it is argued that procrastination leads to poorer performance, some people report using procrastination as performance *enhancing* strategy; it helps get them to marshal their resources to cope with an oncoming deadline (Chissom & Iran-Nejad, 1992; Tice & Baumeister, 1997). However, if procrastination is irrational as well as representative of low conscientiousness, this “last-ditch” effort should tend to be less successful than efforts made well before the last minute. As with mood, poor performance permits the possibility of reciprocal relationships, such as self-efficacy related failure spirals (Lindsay et al., 1995). That is, procrastination may lead to poorer performance, which lowers self-efficacy, which in turn leads to more procrastination.

Demographics

It is unlikely that any personality trait is homogenously distributed throughout a population. Fortunately, researchers have consistently provided the information needed to evaluate three possible demographic moderators of procrastination: age, sex, and year.

Age

People should procrastinate less as they age and learn. As O’Donoghue and Rabin (1999) conclude, “Many people who procrastinate only moderately do so not because of intrinsic self-control, but because they have developed schemes to overcome procrastination” (p. 807). It is evident that we can learn to avoid procrastination. Ainslie (1992) and Baumeister et al. (1994)

review considerable research showing that people tend to procrastinate less with repeated practice.

Sex

The anticipated influence of sex on procrastination is difficult to predict. Previous investigation into gender differences and the related construct of self-control have found mixed results (Feingold, 1994). Men may score higher, lower, or the same as women depending on the measure. However, meta-analytic results do show that girls score higher on effortful control than boys (Else-Quest, Hyde, Goldsmith, & Van Hulle, 2006). On balance then, we could expect procrastination to be weakly associated with males.

Year

As previously mentioned, Kachgal et al. (2001) believe that procrastination is on the rise. This would be consistent with the increase in other forms of self-regulatory failure (e.g., obesity, gambling, excessive debt) over the last 25 years (Griffith & Parke, 2002; Sivy, 2000; Wadden, Brownell, & Foster, 2002). Since cohort effects in personality do appear to exist (e.g., Roberts, Walton, & Viehtbauer, 2006) and since procrastination may be susceptible to environmental influences (e.g., task aversiveness), such an increase is a definite possibility. However, although self-reports provide the best available data for studying the historical prevalence of procrastination, it is always possible that any observed trend represents changes in cultural response sets (e.g., a greater willingness to admit procrastination) rather than reflecting a true change in underlying behavior.

Temporal Motivation Theory

As van Eerde (2003) concluded in her review, “A more comprehensive theoretical framework of procrastination is still needed” (p. 1412). One promising candidate is Temporal

Motivation Theory (Steel & König, in press), a synthesis of traditional, well-established motivational formulations that include time as a fundamental term. An integration of this type has been proposed by several authors (Loewenstein & Prelec, 1992; Rachlin, 1990; Schouwenburg & Groenewoud, 1997), including Akerlof (1991), the Nobel Prize winning economist. This synthesis addresses a major problem in psychology, as Staats (1999) concludes: “The task that will not go away and that, until faced, will sentence psychology to the ranks of ‘would-be science’ – is that of unification, of weaving threads together” (p. 8). Similarly, as Zeinder, Boekaerts, and Pintrich (2000) indicate specifically for the self-regulatory literature, “The fragmentation and disparate, but overlapping, lines of research within the self-regulation domain have made any attempt at furthering our knowledge an arduous task” (p. 753).⁴

Elements of Temporal Motivation Theory are derived primarily from expectancy theory and hyperbolic discounting, although it can be applied to need theory, prospect theory, psychobiology, and goal setting theory. Its simplest formulation is:

$$Utility_i = \frac{E_i \times V_i}{\Gamma_i D}$$

Utility refers to how desirable a task or choice is. By definition, we pursue whatever behavior has the highest utility. As the numerator of the equation indicates, activities that are high in Expectancy (E) and Value (V) should be more desirable. The denominator of the equation captures the element of time. Enjoyable activities that are immediately realizable (D), that have a short *delay*, should be more highly valued. As delay becomes large, utility necessarily shrinks. Γ refers to the person’s sensitivity to delay, and the larger Γ becomes, the greater is the sensitivity. To apply the equation to punishments rather than rewards, merely take its reciprocal. In other words, we prefer our punishers to be distant, unlikely, and small.

Figure 1 illustrates how TMT can account for procrastination. It maps the changing levels of utility, the desire to perform, for Thomas Delay. He is a college student who has been assigned an essay on September 15th, the start of a semester, due on December 15th, when the course ends. To simplify matters, Tom has two choices over the course of his semester, studying versus socializing. Tom likes to socialize, but he likes to get good grades even more. However, since the positive component of socializing is perpetually in the present, it maintains a uniformly high utility evaluation. The reward of writing is initially temporally distant, diminishing its utility. Only towards the deadline do the effects of discounting decrease, and writing becomes increasingly likely. In this example, the switch in motivational rank occurs on December 3rd, leaving just 12 days for concentrated effort.

To demonstrate TMT's validity, each of its four components should show strong correlations with procrastination, as shown in Table 1. To begin with, *Expectancy* is most strongly represented by self-efficacy, which is a broader but closely related concept (Bandura, 1997). As is typical in the procrastination literature, self-efficacy is assessed primarily for the academic and work domains. Second, *Value* is represented by three major variables. It is directly expressed by *Task Aversiveness*. The more unpleasant a task, the more likely we will put it off. Also, *Need for Achievement* should be negatively associated with procrastination. Those high in the need for achievement are more likely to enjoy working for its own sake. Similarly, *Boredom Proneness* should be negatively associated, since boredom makes work less pleasant. Of note, neuroticism is not expected to affect procrastination. For anxiety to have an effect, according to TMT, it must differentially affect some tasks and not others. For the example of Thomas Delay (see Figure 1), free-floating anxiety will decrease the utility of writing but will also drop the

utility of socializing by an equal amount, leaving the intersection between the two lines unchanged.

Third, several variables should be associated with sensitivity to delay. The individual difference variables of *Distractibility*, *Impulsiveness*, and *Self-Control* are all associated with Γ (Ainslie, 1975; Madden, Petry, Badger, & Bickel, 1997; Ostaszewski, 1996, 1997; Petry, 2001; Richard, Zhang, Mitchell, & de Wit, 1999). As people become more impulsive or distractible, the likelihood that they will procrastinate should increase. Also, age should be negatively correlated with procrastination, since Green, Fry, and Myerson (1994) found that temporal discounting tends to decrease with age.

Fourth, *Delay* is directly expressed by *Timing of Rewards and Punishments*. Procrastinators should work very hard, but only just before the deadline. Furthermore, *Organization*, especially as represented by goal setting (Steel & König, in press), may effectively shorten the delays by the creation of proximal goals, thus increasing work effort. In addition, a necessary outcome of hyperbolic time-discounting is an *Intention-Action Gap* (e.g., Loewenstein & Elster, 1992; Read, 2001). When choices are made regarding distal courses of action, the effect of delay is minimal. Our decisions, consequently, tend to be more rational, reflecting just the magnitude of reward. As time progresses, however, delays shorten and their effects become more pronounced. Consequently, our original intentions can suddenly change and we find ourselves pursuing smaller but more readily realizable rewards. Figure 2, using TMT, shows how intentions to spend or save money (as represented by the utility concept along the y-axis) can switch merely as a function of delay.

Aside from this convergent validation, this meta-analysis provides considerable discriminant validity for Temporal Motivation Theory as well. There are strong theoretical

traditions suggesting that procrastination is due to neurotic or rebellious elements, upon which much of clinical practice is based. TMT indicates that these other variables should not be associated or at most be weakly associated with procrastination. Consequently, positing a lack of a relationship is also a strong test of the theory.

Method

Article Search

Explorations into procrastination have cut across a variety of fields, including psychology, sociology, political science, and economics, requiring a broad search to gather the appropriate publications. As an initial resource, the Procrastination Research Group (2002) has attempted to maintain a list of articles, chapters, books, and dissertations on procrastination and maintains a copy on-line. Although admirably extensive, this list is incomplete, especially in regards to articles from the fields further from psychology. To supplement this list, the following steps were taken.

First, several databases were searched. For all available years to present, the computer databases of *ABI/INFORM*, *EconLit*, *ERIC*, *MEDLINE*, *PsychINFO*, *Proquest Digital Dissertations*, and the *Academy of Management Online Article Retrieval System* were explored, primarily using the keywords procrastination, dynamic inconsistency, temporal discounting, and hyperbolic discounting.

Second, the *Social Sciences Citation Index* (i.e., *Web of Science*) was searched for all publications that cited an article regarding procrastination assessment. Specifically, these included Academic Procrastination Scale (APS; Milgram & Toubiana, 1999), Adult Inventory of Procrastination (AIP; McCown & Johnson, 1989), Aitken Procrastination Inventory (API; Aitken, 1982), Decisional Procrastination Questionnaires (DPQI, DPQII; Mann, 1982; Mann et

al., 1997), General Procrastination Scale (GPS; Lay, 1986), Procrastination Assessment Scale-Students (PASS; Solomon & Rothblum, 1984), Procrastination Log – Behavior (Lopez & Wambach, 1982), Procrastination Self-Statement Inventory (PSSI; Grecco, 1984), Test Procrastination Questionnaire (TPQ; Kalechstein, Hecovar, Zimmer, & Kalechstein, 1989), and Tuckman Procrastination Scale (TPS; Tuckman, 1991).

Third, if an author was found to have published more than one article on procrastination, the author was contacted where possible. This was done in order to uncover individual research programs on procrastination (i.e., “file drawer” problem).

Fourth, once procrastination-focused references were obtained, each publication’s reference list was also examined for other publications. Masters and doctoral dissertations were included in this review as well as unpublished works, when the requisite author was reachable and responsive. Foreign-language articles were also included. In total, 553 sources were initially identified for review.

Usable data included effect sizes involving a measure of procrastination that are expressed as bivariate correlations or are derivable from (e.g., *t*-score, *d*-score or *F*-score). After excluding those that mentioned procrastination peripherally or failed to provide data (e.g., counseling case studies of procrastination), this review considers 216 separate works: 7 book chapters, 7 conference proceedings, 3 unpublished papers, 5 electronic sources, 141 journal articles, and 53 theses. In total, 691 independent correlations are reported. All studies were double-coded and discrepancies resolved to ensure accuracy. Measures were sorted into their appropriate traits and categories through analytic discussion (e.g., by reviewing the scale description and items). Where consensus could not be reached, measures were excluded. A list reflecting how all measures were sorted is available on request.

In addition to study results that can be reduced to single bivariate correlations and consequently meta-analytic summary, procrastination has been examined with a wide variety of other methodologies. These include longitudinal and experimental research designs, as well as statistical techniques such as structural equation modeling and factor analysis. Also employed was survey research regarding why people procrastinate, and hypothetical scenarios regarding where and how people typically would report procrastination. This body of research provides further insights and is incorporated in this review.

Meta-Analytic Method

The summary of the results primarily follows the Hunter and Schmidt (1990) psychometric meta-analytic procedure. It is designed for estimating the mean effect size and the amount of residual variance in observed scores after considering artifacts, usually sampling error and unreliability. Mean effects sizes are expressed as correlations, consequently requiring the conversion of *t*-scores, *d*-scores, and *F*-scores where necessary and possible. For all variables, corrections were employed for dichotomizing a continuous score, uneven splits, range restriction as well as range *enhancement*, which is similar to range restriction except that one selects only extreme scores. When a study used multiple measures of procrastination or of another target variable, these were averaged so that only one independent correlation was included in the analysis.

The confidence interval refers to the precision with which the expected mean effect is measured; consistent with the random effects model, the heterogeneous form is employed here (Whitener, 1990). The credibility interval refers to the limits within which an observed effect will likely be in any particular population, that is the degree of generalizability. It is based on the

residual variance after accounting for sampling error (i.e., SD_r) and, in this study, unreliability (i.e., SD_ρ). Large credibility intervals indicate the presence of moderator effects.

The meta-analytic method used here does differ from that of Hunter and Schmidt (1990) in one respect. Their equation for estimating SD_r (i.e., moderator effect, between-studies variance), which determines the width of the credibility intervals, tends to underestimate as the number of studies decreases (Cornwell & Ladd, 1993; Hall & Brannick, 2002; Steel & Kammeyer-Mueller, 2002). This bias is primarily due to using the sample-size weighted mean correlation in place of true ρ , which, if it could be obtained, would give a less biased finding. Brannick (2001) offers a simple fix to this problem that is consistent with the random effects model and other variance estimates (e.g., the standard deviation): multiply the original variance figure by $K/(K-1)$. This correction is employed.

Finally, for estimating the effects of unreliability, Hunter and Schmidt (1990) suggest that the reliability of scales may be obtained from studies other than those used in any specific analysis. Consequently, the reliability of each measure for each study was based upon the sample-size weighted average of all studies using that scale within this meta-analysis. When no study provided the needed reliability, the sample-size weighted average of similar measures was employed. This allowed the reliability correction to be conducted on an individual study level rather than through artifact distribution. As is typical, ρ refers to the reliability corrected, sample-size weighted, mean effect size.

Moderator Search

Although it is unlikely that all of the variance in results can be accounted for, it can be substantially reduced through a moderator search. At a minimum, Wortman (1994) recommends investigating differences in methodology. On this point there is little variance, with most studies

using a correlational design based on self-reports. This leads to the possibility of system-wide mono-method bias (i.e., Campbell & Fiske, 1959), although this has been addressed in specific studies (e.g., Scher & Osterman, 2002; Steel et al., 2001), with effects ranging from none to weak depending upon the variable examined (e.g., self-reports generate very similar results to other-reports). Still, several methodological variables can be considered. As is typical in many research venues, most of the studies employed young university students. To address whether this is a limitation to the generalizability of the findings, a moderator search based on age of participant was conducted. In addition, the studies were coded according to whether the samples represented student, general, or adolescent/child populations. It is also possible that some studies were conducted more carefully than others. Since the difficulty of estimating study quality is extreme (Wortman, 1994), it is fortunate that this issue is more relevant for experimentally based meta-analyses. Most of the results here are based on a relatively straightforward correlational design, and quality should not have a substantial impact. Still, study results were coded as being from journals and non-journals as well as published and non-published, with the expectation that journal and published articles on average are of better quality. Also, extreme correlations were examined to determine if they represented outliers, as per Huffcutt and Arthur (1995). Studies that had a sample-adjusted meta-analytic deviancy of four or higher were excluded from the analysis, although at times it was possible to check and correct such extreme scores with the lead author. In this way, two typographical errors were detected where the sign of the correlation was reversed in print.

Ultimately, the impact of methodological differences was minimal. Neither age, nor journal status, nor group significantly moderated any relationships. Publication bias was detected, but for only two of the relationships, neuroticism and irrational beliefs. Published

works tended to have .06 and .09 higher correlations, respectively, than unpublished. There was one other detectable source of variance: the measures employed. This is a common issue during meta-analysis (Doty & Glick, 1998), as similar, although not identical, indices were grouped together to reduce redundancy. For example, the average disattenuated correlation among the procrastination measures was .70, which reflects substantial similarity, justifying aggregation, but also possible differences. To determine whether different scales or tests used had a substantive effect, the following moderator searches were conducted: i) Impulsive versus Non-Impulsive Neuroticism, ii) Perfectionism versus Irrational Beliefs, iii) Extraversion versus Positive Affect, iv) Boredom Proneness versus Sensation Seeking, and v) Need for Achievement versus Intrinsic Motivation.

There are a variety of techniques for detecting these possible moderators during meta-analysis. Recent work by Steel and Kammeyer-Mueller (2002) indicates that weighted least squares (WLS) regression provides the most accurate results. Consequently, WLS is employed here, with categorical variables dummy coded. As recommended (Tabachnick & Fidell, 1989), analysis is limited to when there are at least five cases (K) per moderator variable. Results are reported where statistically significant ($p < .01$).

Results

The meta-analytic results are reported in the same subsections used in the literature review and are summarized in Tables 2 to 6. Also reported in these subsections are the results from other methodologies (e.g., experiments, surveys).

Task Nature and Procrastination

Two task characteristics are thought to affect procrastination. First, we tend to favor tasks that are more pleasant in the short-term, even if they are detrimental to ourselves in the long-

term. Second, the more intrinsically unpleasant a task is, the more likely we are to avoid doing it. However, only task aversiveness proved amenable to meta-analytic summary, and its results are reported in Table 2.

Timing of Rewards and Punishments

Although research has been performed on temporal effects specific to procrastination, it has not been correlational and thus is not summarized meta-analytically. Still, the results do support a strong relationship. Mazur (1996, 1998) experimentally investigated procrastination in animals, finding that pigeons will indeed put off doing a small amount of work now for a delayed reward, in favor of having to do much more work later for the same result. Also, self-report methodology indicates the importance of temporal proximity. When students were asked how much they would procrastinate under various conditions, they indicated that their procrastination would diminish as the task nears completion or as a deadline approaches (Schouwenburg & Groenewoud, 2001; Strongman & Burt, 2000).

Task Aversiveness

The importance of task aversiveness in triggering procrastination has received strong support from a variety of research methodologies. To this end, several researchers administered the Procrastination Assessment Scale-Students. Part of this instrument asks respondents to indicate why, out of 26 possible reasons, they might procrastinate in writing a term paper. Factor analysis of responses consistently generates a dimension best described as “Aversiveness of Task,” with its most popular item, “Really dislike writing term papers,” endorsed by 45% of the respondents (Kachgal et al., 2001; Peterson, 1987; Rawlins, 1995; Solomon & Rothblum, 1984). Using comparable formats, several researchers found that two top-rated reasons for procrastinating before performing a task were that the task was unpleasant, or that it was boring

and uninteresting (Anderson, 2001; Briody, 1980; Froelich, 1987; Haycock, 1993). Using an open-ended format, Ferrari (1993a) elicited a similar reason why people shopped late for Christmas: they disliked shopping.

In addition, aversiveness has been investigated for several different types of tasks, including personal projects, daily tasks, academic tasks (such as publication), and job search behaviors. This research has employed a variety of methodologies, including the more rigorous formats of time sampling and daily logs (Ferrari & Scher, 2000; Pychyl et al., 2000). Consistently and strongly, the more people dislike a task, the more they consider it effortful or anxiety producing, the more they procrastinate ($\bar{r} = .40$, $K=8$). Interestingly, two moderators of this effect are reported. First, aversiveness effects intensify if the projects are short-term (Lay, 1987, 1990). Second, this relationship between procrastination behavior and task aversiveness is moderated by conscientiousness, with low conscientiousness apparently increasing the effect of task pleasantness on procrastination (Lay & Brokenshire, 1997; see also Somers, 1992). The correlation between trait procrastination and finding tasks aversive in general is also strong and stable ($\bar{r} = .40$, $K=10$). This correlation indicates that one possible reason why some people procrastinate more is simply that they find more of life's chores and duties aversive.⁵

Finally, several researchers have considered what type of task adversiveness is best correlated with procrastination. Jobs characterized by lower autonomy, task significance, and feedback were likely to increase decisional procrastination (Lonergan & Maher, 2000), although they were less related to behavioral procrastination (Coote-Weymann, 1988; Galué, 1990). Instead, behavioral procrastination was most strongly associated with the aversive task components of frustration, resentment, and particularly boredom (Ackerman & Gross, 2005; Blunt & Pychyl, 2000; Briody, 1980; Haycock, 1993; Puffer, 1989; Strongman & Burt, 2000).

Similar results were found using experimental methodology (Senécal, Lavoie, & Koestner, 1997; Sigall, Kruglanski, & Fyock, 2000). The more boring and difficult a task was made, the more likely people were to delay doing it.

Individual Differences

Individual Differences is the largest of the sections, dealing with the results for a wide range of variables. Tables 3 through 5 meta-analytically summarize all these findings.

Neuroticism

The results for neuroticism and its facets are summarized in Table 3. Despite generating a weak positive correlation ($\bar{r} = .24$, $K=59$), it is at best *very* weakly associated with procrastination. To begin with, a weak positive correlation between neuroticism and procrastination should be expected due to method effects alone. Those who are more anxious or have more negative affect tend to be harsher judges of their own behavior, but are not necessarily poorer performers (Carver & Scheier, 1990; Ellis, 1989; Sarason, Sarason, & Pierce, 1990). That neuroticism appears to be essentially unrelated to observed procrastination (Steel et al., 2001; or fear of failure, Ackerman & Gross, 2005) supports this assertion.

Furthermore, neuroticism's connection to procrastination appears to be primarily due to impulsiveness, *not anxiety*. Results analyzed at the facet level indicated that neuroticism's connection to procrastination was "largely a matter of impulsiveness" (Schouwenburg & Lay, 1995, p. 488; see also Johnson & Bloom, 1995), and that it added little unique variance over conscientiousness. More recently, structural equation modeling analysis indicates that neuroticism has no direct links to procrastination and that any relationship is fully mediated by conscientiousness (Lee, Kelly, & Edwards, 2006). Support for this conclusion can be found by segmenting the results specific to neuroticism by measure: the EPQ (Eysenck & Eysenck, 1975),

the BPP (Harary & Donahue, 1994), and the BFI (John, Donahue, & Kentle, 1991) do not nest impulsiveness with neuroticism to the same extent as the NEO (Costa & McCrae, 1992) or the EPI (Eysenck & Eysenck, 1964). Examining the studies that used the non-impulsive related measures suggests a mean correlation of only .16, while examination of those that used the impulsive measures suggests a mean correlation of .33. Using WLS regression, this is a significant difference ($F(1,18)=47.84, p<.001$).

Finally, there are two other anxiety-related issues. First, McCown et al. (1987) reported a curvilinear relationship between neuroticism and procrastination that explained approximately 61% of the variance. This is an extremely strong finding, but not equally robust. Unfortunately, no supporting result has been reported in any subsequent work (Johnson & Bloom, 1995; Schouwenburg & Lay, 1995; Steel et al., 2001), and the original work of McCown et al. could be considered anomalous. Second, Blatt and Quinn (1967) argued that procrastination was due to a form of anxiety, specifically fear of death. Testing this, Donovan (1995) found a correlation of .28 between procrastination and the Death Anxiety Scale, which is not significantly different from the results obtained for general anxiety.

Irrational beliefs.

Although clinical work stresses that irrational beliefs are a major source of procrastination, results are irregular and often weak. Meta-analytic review indicates that the average correlation is .17 ($K=71$). However, significantly weaker as well as stronger results have been obtained with two different specific forms of irrational beliefs.

Using WLS regression, self and other perfectionism proved to be much lower ($F(1,67)=11.53, p<.001$) than other forms of irrational beliefs. Only socially prescribed perfectionism, where we believe that significant others have set standards for us, is even weakly

related to procrastination ($\bar{r}=.18$; analyzed with other fear of failure constructs). According to Haycock (1993), only 7% of people surveyed report perfectionism as contributing to their procrastination. In addition, the Almost Perfect Scale (Slaney, Ashby, & Trippi, 1995) of perfectionism has four items related to procrastination. As found by Enns and Cox (2002) and Slaney, Rice, and Ashby (2002), perfectionists generally scored the same or lower on procrastination than non-perfectionists, the exception being perfectionists who were also seeking clinical counseling.

However, WLS regression indicates that somewhat stronger results were obtained with more general irrational belief scales ($F(1,67)=5.73, p=.02$), such as the Self-Critical Cognition Scale (Ishiyama & Munson, 1993). Other research also indicates that irrational beliefs do appear to be the source of at least some procrastination. Solomon and Rothblum (1984) extracted a fear of failure dimension from a factor analysis of 26 procrastination reasons, a finding repeatedly replicated (Brownlow & Reasinger, 2000; Clark & Hill, 1994; Harrington, 2005; Milgram, Marshevsky, & Sadeh, 1995; Onwuegbuzie, 2000b; Peterson, 1987; Rawlins, 1995; Schouwenburg, 1992). The dimension consists of evaluation anxiety, low self-confidence, and perfectionism. Its most popular item was endorsed by approximately 17% of respondents (Kachgal et al., 2001; Solomon & Rothblum 1984). A typical item is “Were concerned you wouldn’t meet your own expectations.” Generating a similar finding, although using an open-ended questionnaire, Briody (1980) and Haycock (1993) found respectively that 16% and 7% of people gave fear of failure as a reason. This discrepancy between correlational and frequency data likely indicates a form of counterbalancing; people may also cite fear of failure as a reason for *not* procrastinating. Using an experimental design, Senécal et al. (1997) found further

support. Procrastinators are more likely to put off difficult and boring tasks when they expect to be evaluated.

Low self-efficacy and low self-esteem.

Both variables were associated with procrastination, both in the expected direction and to the expected degree. Self-efficacy showed the strongest relationship, with meta-analytic review giving its average correlation as $-.38$ ($K=39$). Two other studies support of the importance of self-efficacy. Briody (1980) found 8% of respondents stating that low self-confidence was a cause of procrastination. Micek (1982) found that procrastinators were more likely to give up on their efforts when encountering an obstacle ($r=.40$). For self-esteem, the average correlation was similarly negative, but weaker at $-.27$ ($K=33$).

Self-handicapping.

The average correlation between self-handicapping and procrastination is $.46$ ($K=16$). As additional evidence, procrastinators tend to spend more time on projects if they are likely to fail, while the opposite relationship is seen for non-procrastinators (Lay, 1990). Similarly, procrastinators were experimentally shown to enter voluntarily into conditions or to engage in activities that self-handicapped their performance on evaluative tests (Ferrari, 1991c; Ferrari & Tice, 2000). However, Lay, Knish, and Zanna (1992) found several divergent relationships between self-handicappers and procrastinators, indicating that although the two overlap conceptually, they are different. While self-handicappers and procrastinators may both delay their efforts, self-handicappers are more likely to engage in other forms of self-handicapping (e.g., avoid practicing for a test).

Depression.

As summarized, depression is associated with procrastination, demonstrating an average correlation of .28 ($K=56$). Aside from depression in general, several studies have focused on one of its symptoms, lethargy or lack of energy. Tiredness is one of the top three reasons that students give for putting off work (Strongman & Burt, 2000). Approximately 28% of students indicated “Didn’t have enough energy to begin the task” as a source of procrastination (Kachgal et al., 2001; Peterson, 1987; Solomon & Rothblum, 1984). Notably, this item was also associated with others indicating task aversiveness.

Other research regarding the relationship between procrastination and pessimism or optimism indicates that this facet of depression may be too complex to be described in a general linear fashion. Although the results for pessimism were not significantly different from those for general depression, Sigall et al.’s (2000) experimental investigation indicates that it is possible to be *too* optimistic. They found that extremely optimistic participants were more likely to procrastinate in initiating an aversive task. An examination of their expectations indicates that they thought they could delay and still finish before the deadline. This finding is similar to Day et al.’s (2000) description of the socially active optimistic, who are confident in their ability to delay their work successfully until later.

Openness to Experience: Intelligence/Aptitude

The results for openness to experience and intelligence/aptitude are summarized in Table 4. Openness to experience shows a scant correlation of .03 ($K=16$). Similarly, the relationship for intelligence/aptitude is low at .03 ($K=14$).

Agreeableness

Meta-analytically, the average correlation of agreeableness is $-.12$ ($K=24$), as per Table 4. However, Kachgal et al. (2000) and Solomon and Rothblum (1984) did extract through factor analysis a dimension titled “Rebellion against Control” when examining reasons for procrastinating. Still, its most popular item, “You resented people setting deadlines for you,” was endorsed by under 5% of respondents.⁶

Extraversion

The results for extraversion and its facets are summarized in Table 4. For extraversion specifically, they are extremely weak, with a correlation of $-.12$ ($K=27$). Furthermore, findings specific to positive affect may potentially show more consistent results, since positive affect emphasizes the energy rather than the impulsivity component of extraversion. Accordingly, confining the meta-analysis to positive affect reveals a correlation of $-.17$ ($K=12$). As WLS regression indicates, it is marginally stronger ($F(1,28)=4.34$, $p=.04$) than measures specific to trait extraversion ($\bar{r}=-.11$, $K=18$). On the other hand, there appear to be aspects of extraversion that lead to procrastination. McCown et al. (1989), using principal components analysis, describe a type of procrastinator as extraverted and outgoing. Similarly, Briody (1980), Froelich (1987), Haycock (1993), and Strongman and Burt (2000) all indicate that a common distraction, social activities with friends, facilitates procrastination. Finally, Senécal, Julien, and Guay (2003) found a correlation of $.30$ between procrastination and a measure of role conflict due to interpersonal relationships.

Impulsiveness.

Evidence suggests that impulsiveness plays a solid role in procrastination. As reviewed, the average correlation between procrastination and impulsiveness is $.41$ ($K=22$). Other research

using related criteria provides additional confirmation. Procrastinators tend not to have a future temporal orientation (Lasane & Jones, 2000; Specter & Ferrari, 2000) and tend to dislike structure or routine (Somers, 1992). Also, they tend not to be stimulus screeners (Lay, 1987). Non-screeners are more sensitive to pleasantness of tasks and thus more likely to be impulsive. Qualitative analysis of procrastination also indicates that typically the decision to procrastinate is impulsive and unplanned (Quarton, 1992). Finally, when asked how they prefer to structure their daily work, procrastinators typically choose to start with the more pleasurable tasks, while non-procrastinators prefer to sequence those last (König & Kleinmann, 2004).

Sensation seeking.

Evidence suggests that perhaps some procrastination is motivated by sensation seeking, but not very much. As summarized, the average correlation with procrastination is .17 ($K=11$). Additional findings in Kachgal et al.'s (2000) and Solomon and Rothblum's (1984) factor analyses suggest that sensation seeking has only marginal importance. These studies extracted a risk-taking dimension by examining the reasons for procrastinating. It was not well endorsed, with only 6.4% of students responding positively to its most popular item, "Looked forward to the excitement of doing this task at the last minute." Likewise, Froehlich (1987) found that one of the lowest rated reasons for procrastinating was, "I like the excitement and challenge of doing things at the last minute."

However, there is one caveat. As mentioned, task aversiveness is strongly associated with procrastination, particularly if the task is boring. Three of the studies on sensation seeking (Blunt & Pychyl, 1998; Ferrari, 2000; Vodanovich & Rupp, 1999) deal specifically with boredom proneness, which shows a significantly stronger relationship with procrastination according to WLS regression ($F(1,9)=20.4, p=.001$), with a $\bar{r}=.40$.

Conscientiousness

The results for conscientiousness and its facets are summarized in Table 5. Several early studies have shown that there was some connection between procrastination and competitiveness or super-ego strength (Effert & Ferrari, 1989; Wessman, 1973). More recent investigations using conscientiousness from the five-factor model of personality indicate that the average correlation is $-.62$ ($K=20$). Of note, Scher and Osterman (2002) found a virtually identical relationship when using other- instead of self-reports.

In addition, once conscientiousness had been partialled out of the correlations between procrastination and the other four trait factors, virtually none of them reached either practical or statistical significance (Johnson & Bloom, 1995; Schouwenburg & Lay, 1995). Also, Schouwenburg (1995) factor analyzed several measures related to procrastination, conscientiousness, and neuroticism. The procrastination and conscientiousness variables loaded together, while those related to neuroticism loaded on a separate dimension.

Self-control/self-discipline.

Researchers have studied self-discipline using a wide variety of self-control, organization, and planning scales. Results, as reported in Table 5, indicate an average correlation of $-.58$ ($K=21$). Other supporting research includes Schouwenburg's (1995) factor analysis, which suggests that self-discipline may be equivalent to trait procrastination, or that it is at least a proximal cause of procrastination behavior. Similarly, procrastinators tend to choose short-term benefits over long-term gains, reflecting a core component of poor self-regulation (Tice & Baumeister, 1997).

Distractibility.

Results firmly support the importance of distractibility. Its average correlation is large at .45 ($K=13$) as well as extremely consistent, as indicated by the credibility intervals. Haycock (1993) identified the availability of distractions as one of the top reasons contributing to procrastination.

Organization.

As expected, organization demonstrates a strongly negative relationship. Results consistently indicate that organization is antithetical to procrastination, with an average correlation of $-.36$ ($K=25$).

Achievement motivation.

One of the first findings in the field of procrastination is that procrastinators tend to have lower achievement drives (Lum, 1960). As meta-analytically summarized, need for achievement combined with intrinsic motivation has an average correlation of $-.35$ ($K=34$). In addition, Lay's (1987) efforts in typology extracted a type of procrastinator that he termed the "underachiever." However, achievement motivation is a broader construct than intrinsic motivation. Accordingly, WLS regression confirms that results are significantly different depending upon whether they deal with need for achievement or intrinsic motivation ($F(1,34)=22.90, p<.001$). Results dealing specifically with need for achievement suggest an even higher correlation of $-.46$ ($K=17$).

Intention-action gap.

Procrastination does appear to be often involuntary, with procrastinators typically agreeing with the statement, "No matter how much I try, I still put things off" ($r=.64$; Stainton, 1993). Other research supports this assertion. To begin with, several studies have compared procrastination with self-reported work intentions over several time periods. The two variables

are almost completely independent, and thus procrastinators usually intend to work as hard as anyone else or harder ($\bar{r} = -.03$, $K=8$). Given this typical lack of difference, researchers have focused on how consistently procrastinators act upon these intentions. One way this has been assessed is by administering procrastination measures in conjunction with a self-report intention-action discrepancy measure, such as Kuhl's (1994) state-oriented hesitation scale or Schouwenburg's (1992) dilatory behavior scale. As Table 5 indicates, dilatory behavior correlates on average .52 with procrastination ($K=16$).

In addition, several researchers investigated this topic by measuring the disparity between intended and actual work habits. As Table 5 indicates, the average correlation was .29 ($K=6$). Of note, the size of this gap is highly contingent on the time separating intention and action. It increases, the further ahead that procrastinators plan their actions (i.e., one week versus two) (Steel, 2002a). On the other hand, the gap decreases and even reverses as the deadline begins to loom (Steel et al., 2001; van Hooft et al., 2005). In the final hour, it is the procrastinator who is doing more work than intended.

Outcomes

Outcomes refer to the expected effects on utility, specifically a poorer mood and worse performance. It is important to note that these outcomes may still represent more distal causes of procrastination, possibly increasing depression or decreasing self-efficacy, for example.

Effect on Mood

The empirical evidence concerning mood is not definitive. Moods have the potential to show a relationship with procrastination where none may exist. Specifically, those in poorer moods are more likely to indicate that they procrastinate, regardless of their actual behavior (Carver & Scheier, 1990; Sarason et al., 1990; Stainton, Lay, & Flett, 2000; Steel et al., 2001).

More importantly, mood changes; procrastinators may feel remorse for their inactions at any time, perhaps even after the experimental session or academic semester has ended.

Consequently, if we tested more frequently or possibly over longer time periods, a previously undetected mood difference could easily appear. Since most of the studies have examined mood over different sections of the timeline, the direction of the relationship is expected to be inconsistent and meta-analytic aggregation does not appear to be advisable.

Supporting the importance of mood, Tice reports that procrastination could be motivated by mood repair (Tice & Bratslavsky, 2000; Tice, Bratslavsky, & Baumeister, 2001). Students who were experimentally manipulated into an unhappy mood were more likely to try lifting their spirits before practicing for an informal math test. However, the long-term success of this strategy seems doubtful, with Pychyl (1995) finding a correlation of .46 between project guilt and project procrastination.

More support for the importance of mood comes from researchers who have used repeated measures of state anxiety or mood over the duration of an academic course. Student procrastinators tend to be more anxious across the entire semester (Rothblum, Solomon, & Murakami, 1986),⁷ and tend to experience less stress early on, but more stress later on and more stress overall (Tice & Baumeister, 1997). This last finding has been replicated in part, where the relationship between procrastination and state agitation (i.e., anxiety) was observed, but only either as an increase at the course end (Assur, 2003; Lay & Schouwenburg, 1993) or as a decrease at the course beginning (Towers & Flett, 2004). Similarly, employee procrastinators tend to continue worrying about their work after leaving the office ($r=.31$; Van Eerde, 1998). Finally, Froelich (1987) and Haycock (1993) asked students retrospectively how they felt after procrastinating, with over 80% of the responses categorized as negative. Similarly, an online poll

by the Procrastination Research Group (2005) based on over 9,000 respondents indicates that 94% find that procrastination has some negative effect on their happiness, with 18% indicating that the effect is extremely negative.

Other researchers, however, indicate no significant relationship between mood and procrastination. When the state anxiety of students was examined just before and then during exams, no relationship was detected between it and procrastination (Lay, Edwards, Parker, & Endler, 1989; Lay & Silverman, 1996). Also, student procrastinators did not become more agitated or dejected after recollecting their study habits, indicating that their relative lack of work was not particularly stressful to them (Lay, 1994). Similarly, a study using experience-sampling methodology over a five-day period did not find any significant relationship between procrastination and negative mood (Pychyl et al., 2000), despite a strong guilt relationship ($r=.42$). Finally, countering Lay and Schouwenburg's (1993) results, Somers (1992) found no significant association between mood and procrastination on the final day of class.

Poor Performance

The relationship between procrastination and performance is similar in strength though opposite in direction as that seen for conscientiousness and performance. Results, as summarized in Table 6, indicate a weak but consistently negative relationship between academic performance and procrastination. The average correlation was $-.19$ ($K=41$). As the credibility interval indicates, procrastination is usually harmful, sometimes harmless, but never helpful.

Other performance criteria confirm the dangers of procrastination. Consistently, procrastination shows negative correlations with GPA, course GPA, final exam scores, and assignment grades (see Table 6). Moving away from academic indicators, Sirois (2004) as well as Elliot (2002) investigated the self-reported impact of procrastination on people's health,

finding significant negative correlations of $-.16$ and $-.22$, respectively. One major reason is that procrastinators tend to postpone getting appropriate medical treatments and diagnostic tests (e.g., Colman, Brod, Potter, Buesching, & Rowland, 2004; Morris et al., 1990; White et al., 1994). Elliot found an even stronger negative relationship, $-.42$, between procrastination and financial well-being. Similarly, Mehabrian (2000) found a significant correlation of $-.26$ between career/financial success and procrastination. Notably, evaluation of success was based on peer-rather than self-report.

Demographics

The demographic analyses are based on aggregating individual level correlations but also include an examination at a group level. Mean levels of procrastination were reported for 136 samples that used one of six primary scales (e.g., API, PASS); the analyses are confined to this set, allowing the statistically control of measurement differences. When a study used multiple procrastination scales, each mean was retained, although the sample was divided among each result to prevent over weighting.

These procrastination measures were converted into a common five-point metric, dummy coded, and then entered first into a WLS (weighted least squares) multiple regression analysis. The subsequent step was to enter the variable of interest (e.g., age). Although individual-level data tends to replicate at the group-level (Steel & Ones, 2002), this is not a necessary outcome (Ostroff, 1993). Meta-analytic results are summarized in Table 6.

Age

Initial, uncorrected results are reported in Table 6, showing that indeed procrastination appears to decrease with age ($\bar{r} = -.15$, $K=16$). However, these results suffer from extreme range restriction. Correcting with a standard deviation based on those of age 12 and up (i.e., $\sigma = 19.5$

years) (US Census Bureau, 2000), the findings become extremely strong, $\bar{r} = -.48$. Those in their senior years are putting off very little.

The effect of age on procrastination was also analyzed on a group level. The results, however, were not significant, ($\Delta R^2 = .01$, $F(1,88) = .54$, $p = .47$). This failure to replicate may be because range restriction was still intense at the group level, where the average mean age was 21.8 and the standard deviation was 4.6.

Sex

Only a weak relationship was expected between sex and procrastination and the results bear this out. After correcting for uneven splits, men do appear to procrastinate only slightly more than women ($\bar{r} = -.08$, $K=44$). At a group level, there were 124 samples that reported the percentage of men that comprise the sample, although the results were not significant at this level of analysis ($\Delta R^2 = .01$, $F(1,125) = 1.86$, $p = .18$).

Year

Publication year for the reported samples with mean data spans 23 years, from 1982 to 2005. Using publication year to indicate sample year, several analyses were conducted. After controlling for the different procrastination measures, year of publication has a significant effect for data up to 2003 ($\Delta R^2 = .06$, $F(1,123) = 7.81$, $p = .006$; $B = .027$). However, including 2004 data diminished this effect ($\Delta R^2 = .03$, $F(1,132) = 4.39$, $p = .04$), and by 2005 it no longer is significant ($\Delta R^2 = .02$, $F(1,135) = 3.12$, $p = .08$). There are several possible reasons for these results, such as cohort effects. However, post hoc analysis indicates that they are due to nationality. If we exclude the data from the USA, which comprises 65% of the results, procrastination in the rest of world is increasing ($\Delta R^2 = .30$, $F(1,43) = 18.85$, $p < .001$; $B = .046$).

Discussion

Procrastination appears to reflect the human condition, since it is presently widespread and has been reported for thousands of years. It is also particularly interesting in that voluntarily delaying an intended course of action despite the expectation of being worse-off for the delay is inherently risky or negative behaviour. Furthermore, procrastination is conceptually linked to the conscientiousness trait, reflecting responsibility (i.e., “the diligent fulfilment of objectives”). This makes procrastination especially important, because it can provide insight into the relationship of traits to performance and motivation. As reviewed, there are theories suggesting a relationship between procrastination and almost every construct, from perfectionism to rebelliousness, and most of these theories have been tested. Efforts to understand procrastination have been intensive, with hundreds of studies covering a wide range of situations and variables. Thus, procrastination is ideal for establishing self-regulation’s nomological web as well as for testing Temporal Motivational Theory, both of which this paper attempts to address.

Regarding procrastination’s nomological web, several strong findings have emerged. Consistent with its conceptual foundation, procrastination does appear to be representative of low conscientiousness and self-regulatory failure. Corrected for unreliability, its correlations were approximately $-.75$, comparable and even occasionally superior to correlations among conscientiousness measures themselves (Goldberg, 1990; Widiger & Trull, 1997). Importantly, the corrected correlation with performance was very close to that obtained by conscientiousness, around the mid $.20$ ’s (Barrick, Mount, & Judge, 2001). This indicates that procrastination largely, although not entirely, accounts for the relationship of conscientiousness to performance. In addition, procrastination was strongly associated with a host of related concepts: distractibility, organization, achievement motivation, and an intention-action gap.

Given this connection between procrastination and conscientiousness, it is not surprising that procrastination shows weaker correlations with other traits. Agreeableness and sensation seeking, for example, generated low correlations, below .20. However, of particular importance are neuroticism and its facets of irrational beliefs and perfectionism. Repeatedly in the popular press and counseling resources, irrational beliefs and perfectionism are taken to be major causes of procrastination, as almost any self-help book or website on the topic will illustrate. This belief has been exacerbated by publication bias, where published works tend to report higher correlations for neuroticism and irrational beliefs than do unpublished works. Although there can be a connection, procrastination does not appear to be anxiety related. The connection with neuroticism appears to be due almost entirely to impulsiveness, which is sometimes nested under that trait. Depression's connection appears mostly due to waning energy levels, which make many tasks more aversive to pursue. Similarly, fear of failure appears to gain its relationship through lack of self-confidence or low self-efficacy, which does have a strong dependable connection. For perfectionism, the results are informative, indicating that procrastinators are actually less likely, not more, to be perfectionists.⁸

However, several results have a conceptually and empirically unambiguous connection to procrastination. Of particular note, procrastination is associated at a rho of $\pm .40$ or greater with individual difference variables of self-efficacy, need for achievement, proneness to boredom, distractibility, impulsiveness, self-control, and organization. Furthermore, the confidence interval widths (see Table 2 to 6) are narrow enough to confirm statistical significance, even after controlling for family-wise error (i.e., $p < .001$). These findings provide good convergent validity of Temporal Motivation Theory (TMT), as every outcome that it predicted was obtained (see Table 1). We tend to procrastinate when the task is aversive or when rewards rather than

punishments are delayed. Similarly, procrastinators tend to act against their original intentions (i.e., an intention-action gap) and tend to be younger rather than older. Finally, variables such as agreeableness and neuroticism, which other theories indicated should be associated with procrastination, were not significantly related, thus demonstrating discriminant validity. These results were confirmed with a wide range of samples, measures, and methodologies. Consequently, TMT does appear to be a good model for integrating the general findings regarding self-regulation.

Implications of Temporal Motivation Theory (TMT)

Because conscientiousness and procrastination are closely linked, TMT provides an excellent foothold towards furthering our knowledge of self-regulatory failure. As Judge and Ilies (2002) conclude, we lack a theoretical framework explaining how personality traits are related to motivation and affect performance. Similarly, as Zeidner et al. (2000) state, “A major problem in exploring the self-regulation construct is mapping out the pattern of interrelationships between self-regulation and related individual constructs, and the underlying processes to which they relate” (p. 755). TMT indicates that there are four major variables to focus upon: expectancy, value, sensitivity to delay, and delay itself. How these variables can improve self-regulation is reviewed, especially as they apply to procrastination.

Expectancy Related Interventions

One way of decreasing the procrastination concerning any task is to increase its expectancy of success. The effect, as indicated in Figure 1, would be to shift its utility curve upward. As the meta-analytic work here indicates, this is particularly true for self-efficacy. Bandura (1997), who provides some of the most extensive work in this area, contends that efficacy expectancy is somewhat susceptible to verbal persuasion and emotional arousal but is

especially influenced by modeling and actual performance accomplishments. By modeling, Bandura refers to vicarious experiences where we observe other people completing the task successfully. By performance accomplishments, he refers to completing the task successfully oneself. Consequently, it may be necessary to acquire or to improve various skills relevant to task completion in order to decrease procrastination later. For example, many people would likely finish their taxes sooner if they were more confident about completing the task successfully. Such confidence is bought largely with empirical confirmation. People must demonstrate to themselves that they are capable of such success.

Value Related Interventions

The review here strongly indicates that task aversiveness, that is decreasing the value of a task, increases procrastination. This is especially true if the task is considered boring or if it is attempted when energy levels are low. Given that we are unlikely to like all tasks equally, we expect some domain specificity with procrastination; there should be differential procrastination depending on whether we examine activities associated with work, health, or socializing, for example. Such domain specificity is not uncommon to motivational traits (e.g., VandeWalle, Cron, & Slocum, 2001). To address task aversiveness, we have a variety of choices.

To begin with, we may choose to make tasks more difficult, although this runs counter to the previous suggestions regarding expectancy. However, increasing task difficulty should reduce boredom and, as the goal-setting literature indicates, can increase the self-satisfaction that arises from completing the difficult rather than the easy (Wright, Hollenbeck, Wolf, & McMahan, 1995). Consequently, tasks should be constructed to be challenging but still achievable. Of note, those with higher needs for achievement may be receptive to this tradeoff between expectancy and value, since they tend to take more pleasure in their accomplishments.

Second, Ainslie (1992) discusses how one might express a long-range interest by indulging in a short-range impulse. By pairing the two together, our more distant goals can “piggy-back” on more immediate concerns. For example, Ainslie writes about a miser who has a wish to give to charity. Unfortunately, the miserliness is experienced more immediately and supersedes the desire to be charitable. However, a stronger and even more immediate urge is to gamble. Consequently, the miser’s long-term interest in benevolent giving can find expression through the occasional indulgence of a casino night at the local church. In this way, a task with distal rewards may be paired with one that offers more immediate recompense. Murray (1938) speaks of a similar phenomenon labeled *fusing*. Different needs may be satisfied through a single action, permitting the desire for one outcome to be augmented by way of another. Other examples of impulse pairing or fusing can include the creation of study groups by those who enjoy socializing. Though the exam may be far off, the pleasant interaction with fellow students can be experienced in the present. A more extreme instance of this strategy may be an entire career change. Someone who is high in the need for cognition, that is, making sense and order of the world, may find work more immediately satisfying and thus easier if he or she pursues an academic rather than a business career.

Finally, one interesting way of changing the value of tasks is through classical conditioning. Eisenberger (1992) discusses how effort towards a goal can be conditioned to take on the reinforcing effects of the goal itself, an effect referred to as learned industriousness. This follows directly from classical conditioning, where as long as effort leads to success at least intermittently, effort will begin to be perceived as reinforcing in itself (i.e., a secondary reinforcer). This conditioning need not be limited to effort. Stromer, McComas, and Rehfeldt (2000) review the more general technique of *stimulus chaining*, where any aspect of work that

provides *differential contingency* for success can be a candidate. Whether the stimulus is pictures, praise, or pennies, as long as it repeatedly predicts the reward, associations will build. In this way, work can become intrinsically reinforcing; that is rewards are experienced during the act, not afterwards. Since there is no delay in the reward, procrastination becomes much less likely. Note that the ratio of successes to failures is of critical importance, especially in the early stages of learning. Too much failure can bring about the opposite outcome of learned helplessness, where effort would become increasingly aversive (i.e., a conditioned punisher), increasing the possibility of procrastination.

Sensitivity to Delay Interventions

Procrastinators tend to be impulsive, distractible, and lacking in self-control; thus, they are very sensitive to delays. Ideally, we would like to influence these characteristics directly, although as personality traits they are fairly stable. There has been some success with treating impulse control disorders through psychopharmacology (e.g., Soutullo, McElroy, & Goldsmith, 1998), but this option is considered too severe to be appropriate for common self-regulatory problems. However, we can more easily affect temptations, to which the impulsive individual is especially vulnerable. Given procrastination's association with distractibility and organization, two methods of reducing distractions can be immediately recommended: stimulus control and automaticity.

First, stimulus control helps to direct behavior by indicating what is appropriate (i.e., rewarding) under any given circumstance. To prevent procrastination, we surround ourselves with cues that confirm our goals and banish any sign that reminds us of temptation. Research indicates that this approach is effective. For example, procrastination decreased for students who studied in the same location (Ziesat, Rosenthal, & White, 1978), a finding which might confirm

the merit of offices. This result was largely replicated by Shoham-Salomon et al. (1989), as well as by Mulry et al. (1994), although both used praise in conjunction with stimulus control.

In particular, Galué's (1990) and Coote-Weymann's (1988) workplace investigations indicate that the most control over procrastination can be achieved by exploiting environmental contributors. Consequently, we should be able to reduce procrastination by simply adjusting situational aspects, specifically the proximity to temptation and the prevalence of stimulus cues. A good example is email, with over 90% of college computer users reporting that they use it to delay irrationally (Brackin, Ferguson, Skelly, & Chambliss, 2000). Since the email icon is perpetually within the field of view and its access borders on instantaneous, simply making email less visible or delaying access to it should decrease procrastination.

Second, Silver (1974) noted that one predictor of procrastination is the number of "choice points" that a task requires. The more junctures that require choice, the more likely it is that we will procrastinate. Consequently, fostering automaticity is a powerful self-control technique. It refers to a habitualized course of action that can be conducted with little or no conscious attention (Bargh & Barndollar, 1996; Karoly, 1993). These automatic routines can maintain goal pursuit, as they limit decision making to that relevant to the task at hand. Because of these confined parameters defined by the task, the decision to do otherwise is never made within a heavily automatized routine. Several researchers speak to this effect. For Kuhl and Goschke (1994), "The repeated use of strict time schedules...fosters the formation of behavioral habits that circumvent conflicts with competing tendencies by establishing quasi-automatic trigger conditions" (p. 107). Also, as Gollwitzer (1996) notes, "As long as the implementation of a chosen goal does not follow habitualized routes, an individual will have to make further decisions" (p. 292).

Delay-Related Interventions

Almost by definition, delay is related to procrastination, and empirically there is strong support. Two particularly relevant findings are that the intention-action gap increases the further the two are temporally separated, and that those who are organized tend not to procrastinate. These findings indicate that making proximal goals should increase motivation, which is entirely consistent with goal setting theory, although the effect is often attributed to providing “additional specific information” (Latham & Seijts, 1999, p. 422). This goal setting research can be supplemented by studies that have been conducted specifically on procrastination.

A considerable amount of research has shown that goal setting does reduce procrastination. Boice (1989) found that daily writing goals helped to keep academic writers on a healthy schedule of publications. Also, in a self-paced course, Brooke and Ruthven (1984), as well as Lamwers and Jazwinski (1989), used contracts for periodic work completion to decrease procrastination. Similarly, Wesp (1986) used daily quizzes to diminish procrastination in a self-paced course. Each set of quizzes was repeated until students achieved mastery of a section, whereupon a new set was administered, thus providing a constant incremental goal to work towards. Finally, Tuckman (1998) administered periodic quizzes in his class, finding that pre-identified procrastinators tended to respond especially well to this intervention. Ariely and Wetenbroch (2002) investigated goal setting (specifically, creating deadlines to prevent procrastination), finding that they were effective, but more effective when set by other people.

Future Research

Extensive further research is needed that will fully explore procrastination and its underpinnings. Although temporal discounting is evidently key to understanding procrastination, and its use is widespread in the field of economics (see Loewenstein, 1992; Steel & König, in

press), the motivational literature has tended not to incorporate the notion (e.g., Franken, 1994; Kanfer, 1990; Mitchell, 1997) and thus can offer only limited contributions. Consequently, there is much interesting work to be done in the scientific fundamentals of description, prediction, and control.

To begin with, although this review strongly indicates that TMT provides an excellent description of procrastination, further confirmation would be desirable. The individual variables composing TMT have been assessed, but there has yet to be a single comprehensive study determining how well the variables work in conjunction. Such a study could include structural equation modeling, which can help eliminate “third variable” explanations (see Lee et al., 2006). However, a more advanced approach is also recommended. Steel and König (in press) suggest that a computerized personal system of instruction (C-PSI) be used for further testing, as it can provide “a wide-range of people who are striving at their own pace towards an important goal in a standardized but realistic setting in which we can precisely but easily measure their behavior.” Such a venue has already been employed for procrastination research (Moon & Illingworth, 2005; Steel et al., 2001) and can be specifically adapted to test TMT. We need to assess the critical variables of expectancy, value, impulsiveness, and delay to determine how well they predict observed procrastination using nonlinear regression with maximum likelihood estimation (Jorgensen, 1983). Nonlinear regression is necessary because TMT is itself a nonlinear equation, and maximum likelihood often helps to improve estimation involving a large number of people.

Furthermore, regarding description, several individual difference variables that were thought to give rise to procrastination proved to have low or practically non-significant correlations. However, clinical practice and self-reports do indicate that some may still remain as contributors to procrastination. Likely, these variables represent one of several avenues by which

tasks are made aversive. For example, those who fear failure dread evaluative events that lack the certainty of success, while those who are rebellious loathe externally imposed deadlines. Whether these traits translate into chronic procrastination depends on their interaction with a host of internal and external variables, including people's innate impulsiveness and need for achievement, the availability of temptations, and the frequency of encountering the tasks that they particularly dread. Future research, then, should not immediately dismiss these traits, but rather determine if they are more distally related. For example, they may be important, but only for a subset of the population and only when their lives are confined to specific situations.

Given that people's reasons for procrastination may be multifaceted, we need a diagnostic procedure that identifies the most promising and pliable junctures in order to lay the foundation for treatment. As theory indicates, there are a variety of reasons why people might irrationally delay a task. As mentioned, they may be surrounded by easily available temptations. They may be excessively impulsive. The task itself may be seen as excessively risky or aversive. Each of these possibilities demands a very different response, and until we can fully assess people's procrastination etiology, our efforts at helping must necessarily be haphazard.

Of particular relevance to diagnosis is a connection between brain functioning and procrastination. In a recent review, Skolyes and Sagan (2002) note the following:

Something in our brains has to give the inner cues that start us doing things, keep us going, and, if need be, change what we are doing. Usually that executive function belongs to our prefrontal cortex. When it is injured, people tend to lose initiative. They may be able to do things, but they don't get around to it. (p. 45)

So far the only investigation of the prefrontal cortex as a source of procrastination has been a doctorate thesis by Stone (1999), who failed to find a significant effect. Still closer examination

is warranted, including examination of other promising brain areas. Of note, researchers studying addiction, another area of irrational decision making, have identified a host of promising neural systems that deal with the self-regulation of behavior (Robinson & Berridge, 2003). In particular, the *anterior cingulate* has a pivotal role in preventing impulsive behavior and maintaining attention to the task at hand.

Regarding control, our traditional treatments for procrastination should be more extensive. Procrastination is usually work related, but industrial-organizational interventions are limited primarily to goal setting and coping with stress (Karoly, 1993; Terry, Tonge, & Callan, 1995). A few alternatives have already been mentioned, but there are still many other methods of regulation that are largely overlooked or whose efficacies are only beginning to be understood. Particularly promising as a method of motivational control is altering one's attention towards a temptation. As an early example, Ainslie (1992) notes that Freudian defense mechanisms (i.e., repression) provide much of their effectiveness by diverting "painful stimuli away from both awareness and motor responsiveness into the unconscious" (p. 128). More recently, Mischel (1996), alone and with others (Metcalf & Mischel, 1999; Mischel, Shoda, & Rodriguez, 1989), reviews this topic in depth, exploring a host of different attentional tactics that children can use to delay gratification.

Finally, procrastination's intention-action gap is of particular importance. Although the capacity of intentions for explaining behavior is debatable (e.g., Greve, 2001), they are still very useful in predicting behavior. Intentions form the crux of action theories, particularly the *Theory of Planned Behavior* (Ajzen, 1991). Meta-analytic summary of the *Theory of Planned Behavior* shows that the intention-behavior correlation is on average .47 (Armitage & Conner, 2001), which increases slightly to .52 with the assessment of Perceived Behavioral Control (i.e., an

expectancy related variable). However, although time is now recognized as moderator, its mechanisms are not yet fully incorporated. For example, as Ajzen (1988) summarizes, “Since the likelihood of unforeseen events will tend to increase as time passes, we would expect to find stronger intention-behavior correlations with short rather than long periods of delay” (p. 116). Although changes of circumstance can undoubtedly affect behavior, as TMT suggests, time itself will affect motivational intensity and thus behavioral direction (see Figure 2). Furthermore, the degree to which people are susceptible to an intention-action gap is largely influenced by the trait of procrastination (van Hooft et al., 2005). Consequently, once trait procrastination is considered, the ability of intentions to predict behavior could increase significantly.

Conclusion

References to procrastination can be found in some of the earliest records available, stretching back at least 3000 years. Some of the first written words, agrarian guides, have lamented it as a substantial problem. Mentions of procrastination have appeared in early Roman and Greek military documents and in ancient religious texts. Looking ahead, procrastination does not appear to be disappearing anytime soon. On the contrary, it and other problems due to temporal discounting should continue to grow in frequency, particularly in the workplace.

Specifically, problems associated with procrastination and lack of self-control appear to be increasing. At the same time, jobs are expected to become more unstructured or at least self-structured (Cascio, 1995; Hunt, 1995). This absence of imposed direction means that the competent worker must create the order – he or she must self-manage or self-regulate (Kanfer & Heggestad, 1997). As structure continues to decrease, the opportunity for workers to procrastinate will concomitantly increase. Furthermore, the prevalence and availability of temptation, for example, in the forms of computer gaming or internet messaging, should continue

to exacerbate the problem of procrastination. There are simply more activities with desirable features competing for our attention. Also, as mentioned previously, other forms of self-regulatory failure are becoming very widespread. Consumer behavior, for example, appears particularly susceptible. An examination of credit card purchases revealed about five times as much last-minute Christmas shopping done in 1999 as in 1991 (“Many Shoppers,” 1999), and credit card debt is reaching unsustainable levels (Sivy, 2000).

In order to deal more effectively with the ubiquitous problem of procrastination, we need to focus our efforts on the role of time in decision making. The theory reiterated here, Temporal Motivation Theory, is a broad integrative formulation based on past work. It addresses a growing need for integrative work that emphasizes the commonalities across different motivation perspectives, letting us share our findings more effectively (Donovan, 2001; Locke & Latham, 2004). However, the motivation field could continue to benefit from a continued detailed examination of temporal effects, such as Construal Level Theory (Trope & Liberman, 2003). Procrastination has plagued human beings since at least the birth of civilization. If our research perspectives fail to evolve, it may continue to define us for a considerable period of time.

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Note: An asterisk denotes studies included in the meta-analysis.

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Footnotes

¹For example, a reasonably close contemporary of Reverend Walker was Jonathan Edwards (1703-1758) who wrote the sermon *Procrastination, or The Sin and Folly of Depending on Future Time* (Hickman, 1998). Also, interestingly enough, the topic has continued to be of religious significance up to present day (see <http://www.sermoncentral.com/>).

²The equation for calculating the heritability coefficient is simply the correlation for identical twins MINUS the correlation for fraternal twins then MULTIPLIED by two. In this case it is: $(.24 - .13) \times 2$ or 22%.

³Although this is the predominant opinion, others argue that the depiction is too simple. As McCown, Petzel and Rupert (1987) discuss, it is equally plausible that neurotics would be extremely prompt so as to remove the dreaded task as quickly as possible. Also, the consequences of facing a deadline unprepared may be so terrible that anxious people work exceedingly hard to avoid ever confronting such circumstances.

⁴For further integration of Temporal Motivation Theory (i.e., an expectancy-value type theory) within a control theory framework, see Vancouver and Day (2005).

⁵Ottens (1982) makes this observation early on, noting that, "Procrastinators perceive task situations in such ways so as to exacerbate their aversiveness" (p. 371).

⁶Of note, Rawlins (1995) found that this was a more popular reason for very young adolescents, with 26% highly endorsing this item. Also, Galué (1990) and Aldarando (1993) extracted procrastination dimensions similar to rebellion, that is "Autonomy" and "Passive-Aggressive" respectively.

⁷Unfortunately, this study is less than decisive. It operationalized procrastination as delay in conjunction with negative affect, thus virtually guaranteeing this effect. On the other hand,

Beswick et al. (1988) report that the “problem” versus “anxiety” versions of their inventory correlated at .89.

⁸As one reviewer noted, there is still an additional issue to be resolved. Although perfectionists do not appear to unduly delay initiating tasks, they may still delay completing them as they strive to meet their own onerous standards.

Table 1

Expected Procrastination Relationships with Variables Related to Expectancy, Value, Sensitivity to Delay, and Delay that Further Validate Temporal Motivation Theory

Construct	Theoretical Connection	Relationship
<i>Expectancy</i>		
Self-Efficacy	Represents the <i>belief</i> that one has the capability of successfully complete a range of tasks.	Negative
<i>Value</i>		
Task Aversiveness	By definition, unpleasant tasks have low value.	Positive
Need for Achievement	Helps to create more pleasure in accomplishment.	Negative
Boredom Proneness	Increases the likelihood that a broad range of life's tasks will be found tedious.	Positive
<i>Sensitivity to Delay (Γ)</i>		
Distractible	All these three variables are empirically related to sensitivity to delay.	Positive
Impulsiveness		
Lack of Self-Control		
Age	Sensitivity to delay tends to decrease with age.	Negative
<i>Delay</i>		
Timing of Rewards & Punishment	Emphasizing the focus of past research, delay is operationalized as the delay for rewards.	Positive
Organized	Helps with the creation of <i>proximal</i> goals.	Negative
Intention-Action Gap	Represents a failure to <i>later</i> act upon intentions.	Positive

Table 2

Summary of Procrastination's Correlational Findings: Task Aversiveness

Construct	K	N	\bar{r}	SD_r	\bar{r} - 95% Interval		ρ	SD_ρ	ρ - 95% Interval	
					Confidence	Credibility			Confidence	Credibility
					<i>Task Aversiveness</i>					
Task Procrastination	8	938	.40	.13	.30 to .51	.14 to .67	.44	.14	.32 to .55	.15 to .72
Trait Procrastination	10	1,069	.40	.12	.31 to .49	.17 to .63	.46	.14	.36 to .57	.19 to .73

Note. Task procrastination refers to whether anyone would procrastinate about performing a specific task if it was aversive. Trait procrastination refers to whether procrastinators find more of life's tasks (e.g., washing dishes, paying bills) aversive.

Table 3

Summary of Procrastination's Correlational Findings: Neuroticism & Related Traits

Construct	<i>K</i>	<i>N</i>	\bar{r}	<i>SD_r</i>	\bar{r} - 95% Interval		ρ	<i>SD_ρ</i>	ρ - 95% Interval	
					Confidence	Credibility			Confidence	Credibility
Neuroticism	59	10,720	.24	.07	.21 to .26	.10 to .37	.28	.08	.25 to .31	.12 to .44
Impulsive Unrelated	10	2,366	.16	.00	.14 to .18	.16 to .16	.19	.00	.17 to .22	.19 to .19
Impulsive Related	10	1,911	.33	.04	.28 to .37	.26 to .40	.37	.06	.32 to .42	.26 to .48
All Irrational Beliefs	71	13,137	.17	.10	.14 to .20	-.03 to .36	.20	.12	.17 to .24	-.03 to .44
Irrational Beliefs	14	2,384	.27	.11	.20 to .34	.04 to .49	.35	.14	.26 to .44	.08 to .62
Fear of Failure ^a	57	10,785	.18	.08	.15 to .20	.02 to .33	.21	.10	.18 to .24	.02 to .40
Perfectionism ^b	24	3,884	-.03	.11	-.09 to .02	-.26 to .19	-.04	.14	-.11 to .03	-.31 to .23
Self-Efficacy	39	6,994	-.38	.09	-.42 to -.34	-.57 to -.19	-.46	.12	-.51 to -.42	-.70 to -.22
Self-Esteem	33	5,748	-.27	.06	-.31 to -.24	-.39 to -.16	-.32	.07	-.36 to -.28	-.46 to -.19
Self-Handicapping	16	2,784	.46	.09	.40 to .51	.27 to .64	.61	.13	.54 to .68	.35 to .87
Depression	56	10,728	.28	.08	.26 to .31	.12 to .45	.34	.10	.31 to .38	.14 to .54

^a Includes: Fear of Failure, Evaluation Anxiety, Social Perfectionism, Self-Consciousness.

^b Includes: Self and Other Perfectionism.

Table 4

Summary of Procrastination's Correlational Findings: Openness to Experience, Agreeableness, & Extraversion

Construct	<i>K</i>	<i>N</i>	\bar{r}	<i>SD_r</i>	\bar{r} - 95% Interval		ρ	<i>SD_ρ</i>	ρ - 95% Interval	
					Confidence	Credibility			Confidence	Credibility
<i>Openness to Experience: Intelligence/Aptitude</i>										
Openness to Exp.	16	3,612	.03	.08	-.02 to .08	-.14 to .20	.04	.10	-.03 to .10	-.16 to .24
Intelligence/Aptitude	14	2,151	.03	.07	-.03 to .09	-.11 to .17	.03	.08	-.03 to .10	-.13 to .20
<i>Agreeableness</i>										
Agreeableness	24	5,001	-.12	.06	-.08 to -.15	-.01 to -.23	-.14	.07	-.19 to -.10	-.28 to -.01
<i>Extraversion</i>										
Extraversion	27	5,032	-.12	.05	-.15 to -.09	-.21 to -.03	-.14	.05	-.18 to -.10	-.25 to -.04
Extraversion	18	3,951	-.11	.04	-.14 to -.07	-.19 to -.03	-.13	.04	-.17 to -.08	-.21 to -.04
Positive Affect	12	1,934	-.17	.05	-.23 to -.12	-.27 to -.07	-.21	.06	-.27 to -.15	-.33 to -.08
Impulsiveness	22	4,005	.41	.10	.37 to .46	.23 to .60	.52	.11	.46 to .58	.30 to .75
Sensation Seeking	11	2,055	.17	.12	.09 to .25	-.07 to .41	.21	.15	.11 to .32	-.08 to .51
Boredom Proneness	3	408	.39	.11	.25 to .54	.18 to .61	.51	.14	.32 to .69	.24 to .77

Table 5

Summary of Procrastination's Correlational Findings: Conscientiousness & Intention-Action Gap

Construct	<i>K</i>	<i>N</i>	\bar{r}	<i>SD_r</i>	\bar{r} - 95% Interval		ρ	<i>SD_ρ</i>	ρ - 95% Interval	
					Confidence	Credibility			Confidence	Credibility
<i>Conscientiousness</i>										
Conscientiousness	20	4,012	-.62	.05	-.65 to -.60	-.71 to -.53	-.75	.06	-.78 to -.72	-.88 to -.62
Self-Control	21	3,840	-.58	.09	-.62 to -.53	-.76 to -.39	-.73	.14	-.79 to -.68	-1.0 to -.46
Distractibility	13	2,232	.45	.09	.39 to .51	.28 to .62	.59	.11	.51 to .66	.37 to .81
Organization	25	4,757	-.36	.10	-.41 to -.31	-.57 to -.15	-.45	.14	-.51 to -.39	-.73 to -.18
Achievement Motivat.	34	6,171	-.35	.11	-.40 to -.31	-.57 to -.14	-.43	.13	-.48 to -.38	-.69 to -.16
Need for Achiev.	17	3,416	-.44	.11	-.50 to -.38	-.66 to -.22	-.55	.13	-.62 to -.47	-.81 to -.28
Intrinsic Motivation	19	3,299	-.26	.06	-.31 to -.22	-.39 to -.14	-.32	.06	-.37 to -.26	-.44 to -.19
<i>Intention-Action Gap</i>										
Dilatory Behavior	16	3,059	.52	.07	.48 to .56	.38 to .66	.64	.08	.59 to .69	.48 to .80
Intention	8	1,017	-.03	.12	-.13 to .08	-.27 to .21	-.03	.14	-.16 to .09	-.32 to .25
Intention-Action Gap	6	533	.29	.00	.22 to .36	.29 to .29	.31	.00	.24 to .38	.31 to .31

Table 6

Summary of Procrastination's Correlational Findings: Poor Performance & Demographics

Construct	K	N	\bar{r}	SD_r	\bar{r} - 95% Interval		ρ	SD_ρ	ρ - 95% Interval	
					Confidence	Credibility			Confidence	Credibility
<i>Poor Performance</i>										
Performance - All	41	7,447	-.19	.09	-.23 to -.16	-.37 to -.01	-.21	.10	-.25 to -.17	-.41 to -.01
GPA	19	4,075	-.16	.07	-.20 to -.12	-.29 to -.03	-.18	.07	-.21 to -.13	-.32 to -.04
Course GPA	10	2,067	-.25	.03	-.30 to -.21	-.32 to -.19	-.28	.03	-.33 to -.23	-.35 to -.21
Final Exam	11	947	-.17	.17	-.29 to -.06	-.50 to .15	-.19	.18	-.31 to -.06	-.54 to .17
Assignments	13	1,973	-.21	.13	-.29 to -.12	-.47 to .06	-.22	.15	-.32 to -.13	-.52 to .07
<i>Demographics</i>										
Age - Uncorrected	16	3,248	-.15	.07	-.20 to -.10	-.29 to -.00	-.16	.08	-.21 to -.11	-.32 to .00
Age - Corrected	16	3,248	-.48	.12	-.70 to -.25	-.71 to -.24	-.51	.13	-.75 to -.27	-.77 to -.26
Sex (M=1, F=2)	44	8,756	-.08	.09	-.12 to -.05	-.27 to .10	-.09	.10	-.13 to -.05	-.29 to .11

Figure Captions

Figure 1. Graph of a student's utility estimation for socializing versus writing an essay over the course of a semester.

Figure 2. Preference reversal between spending and saving as a function of time remaining to cash bonus and hyperbolic discounting.



