

Running head: PROCRASTINATION

The Nature of Procrastination

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Abstract

Procrastination is prevalent and pernicious but not entirely understood, motivating this empirical and theoretical review. The review attempts to be exhaustive, drawing upon correlational, experimental, and qualitative findings. Summarizing 648 correlations, a meta-analysis of procrastination's causes and effects 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 entirely consistent with a hybrid of two theories of choice behavior, expectancy and hyperbolic discounting. Continued research into the prediction and treatment of procrastination should not be delayed, especially since its prevalence appears to be growing.

The Nature of Procrastination

Procrastination is clearly prevalent. Though virtually all of us have at least dallied with dallying, some have made it a way of life. Estimates indicate that 95% of college students engage in procrastination (Ellis & Knaus, 1977), approximately 75% consider themselves procrastinators (Potts, 1987), and almost one-half do it consistently and problematically (Day, Mensink, & O'Sullivan, 2000; Haycock, 1993; Micek, 1982; Onwuegbuzie, 2000a; Solomon & Rothblum, 1984). Even for the average student, procrastination is considerable, representing over one third of their reported daily activities (Pychyl, Lee, Thibodeau, & Blunt, 2000). Furthermore, these percentages appear to be on the rise (Kachgal, Hansen, & Nutter, 2001). Aside from 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). Justifying this viewpoint, several studies have linked it 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). At larger levels of analysis, procrastination has been linked to several organizational and societal issues. Gersick (1988) describes how teams consistently delay the bulk of their work until deadlines approach. The economists 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 Presidential decisions (Farnham, 1997; Kegley, 1989) and the banking practices of nations

(Holland, 2001), both where important decisions are disastrously delayed. Also, historical analysis indicates it has been a pernicious affliction for at least the last 3,000 years (Steel, 2003).

Unfortunately for such an extensive and harmful phenomenon, much has yet to be learned about its causes or its effects, though there have been some notable reviews. To begin with, Ferrari, Johnson, and McCown's (1995) book on the topic is extensive but focuses primarily on theory, with less emphasis on empirical findings. On the other hand, Van Eerde (2002) did conduct a meta-analysis on procrastination, but based on 88 articles, it represents approximately half the sources presently available. In addition, the review does not include several key variables (e.g., task effects, impulsiveness) or relevant experimental findings, and does not extend theoretical foundations. Finally, Steel (2003) has written an extensive theoretical and meta-analytic review of procrastination's history and measurement, though this does not examine its correlates or causes.

To further resolve procrastination's conflicting findings and theories, I endeavor to review and synthesize the conceptual and empirical work completed thus far. To help summarize researchers' prolific efforts, results are divided into the following subsections: Phenomenology of Procrastination, Task Characteristics, Individual Differences, and Demographics.

Phenomenology of Procrastination deals with findings that are taken to reflect procrastination itself. Task Characteristics indicate environmental causes of procrastination. Individual Differences deals with relevant personality traits. Finally, Demographics reviews possible physical, cohort, and geographic moderators.

Phenomenology of Procrastination

Procrastination is defined as the voluntarily delay of an intended course of action despite expecting to be worse-off for the delay (Steel, 2003). Consequently, the nature of procrastination

should be observable in: I) Intention-Action Gap, II) Mood, and III) Performance. The intention-action gap refers to the degree that people follow-up on their original work plans. Mood and performance assesses both subjective and objective utility respectively. If the definition of procrastination is accurate, the following three effects should be observed.

Intention-Action Gap

In procrastinating, most researchers suppose that delaying is not only irrational, but also unintentional (e.g., Silver & Sabini, 1981). They believe procrastinators do not purposefully put off their chores, but do so to the contrary of their original intent – an “is” vs. “ought” scenario. If this is true, it is of some importance as it confirms the basic nature of procrastination: it deals with intended tasks.

Hypothesis 1: Procrastinators should delay contrary to the original intentions.

Mood

It has long been suggested that procrastination impacts mood, especially state anxiety. Since its psychological beginnings, procrastination has been viewed as a way of temporarily evading anxiety that unfortunately becomes compounded when later faced (Mayers, 1946; Solomon & Rothblum, 1984). In this way, procrastination may initially improve mood though later it may worsen it.

Hypothesis 2: Procrastinators should feel worse overall due to their procrastination.

Performance

Some people report using procrastination as performance *enhancing* strategy, that it helps marshal one’s resources to cope with an oncoming deadline (Chissom & Iran-Nejad, 1992; Tice & Baumeister, 1997). In the words of Sommer (1990): “The students mobilize their full intellectual and physical prowess. With nonstop perspicuity they swoop down on the material,

mold it, master it, and deposit it in the nick of time” (p. 6). However, if procrastination is irrational, this last-ditch effort should not be entirely successful.

Hypothesis 3: Procrastinators should perform worse overall.

Task Characteristics

Procrastination involves voluntarily choosing one behavior or task over that of other options despite expecting to be eventually worse off for the choice. 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, about 50% of people respond that their procrastination was due to some task characteristic (Briody, 1980). Two predictable environmental factors have been suggested: I) Timing of Rewards & Punishments, and II) 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 Lowenstein (1992) traces its roots from a predominantly economic standpoint in terms of *temporal discounting*. Support for this effect is bountiful, with sufficient research to formally place it as one of the psychological laws of learning (Schwartz, 1989) or the dominant economic model of intertemporal choice or discounted utility (Lowenstein & Elster, 1992). Given this foundation, it is unsurprising 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 as

an explanation. O'Donoghue and Rabin (1999) used the economic discounted utility model to describe various forms of human procrastination such as our tendency to inadequately save for retirement.

Hypothesis 4: Procrastination should decrease as tasks become temporally proximal.

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). Though there may be a variety of reasons we dislike a task, if we do find it unpleasant, research indicates we are indeed more likely to put it off. Of note, the hedonic nature of the task can only account for procrastination in combination with that regarding temporal placement. By itself, it primarily predicts only task avoidance, not task delay.

Hypothesis 5: Procrastination should increase as tasks become aversive.

Individual Differences

There is some evidence that there may be a biological or genetic component to procrastination. A recent unpublished study by Arvey, Rotundo, Johnson, and McGue (2002) asked 118 identical and 93 fraternal male twins reared in the same family to indicate the degree to which they were a "procrastinator" on a 7-point Likert scale (1=Never, 7=Always).¹ The intraclass correlations for this item for identical twins was .24 and for the fraternal twins it was .13; suggesting that approximately 22% of the variance on this item was associated with genetic factors. Also, eight short-term studies ($N = 715$) were located that had test-retest reliability data. After an average delay of 33.6 days, the average correlation was .75. 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. Individual differences do appear to matter. 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. Still, several researchers have focused their work on a single facet of trait. Since the field of personality lacks definitive terminology at the facet level (John & Sanjay, 1999), this generates an unwieldy number of relationships. To reduce redundancy and illuminate potential patterns, comparable constructs are grouped for discussion. Facets are considered comparable if they can be grouped under a common trait and if they also share a similar theoretical association with procrastination.

Continuing, 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, though Intelligence/Aptitude is also considered here. Finally, Conscientiousness is divided into four further facets: I) Self-Control, II) Distractibility, III) Organization, and IV) Achievement Motivation.

Neuroticism

Similar in etiology to task aversiveness, some researchers have also explored neuroticism as a source of procrastination. Neuroticism is extremely similar to worrying, trait anxiety, or negative affect. As depicted by the neuropsychologist Gray (1987) and other researchers (Carver

¹ This one-item on procrastination was suggested for inclusion in the study by the present author.

& White, 1994; Tellegen, 1985), they likely all describe manifestations of the behavioral inhibition system, a brain function that alerts people to danger or punishment. 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 much of life's large and little duties.²

Hypothesis 6: Procrastination should be positively correlated with neuroticism.

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 unprovable. Since these beliefs create anxiety, they may foment procrastination in a similar manner as thought for neuroticism; they make certain tasks increasingly unpleasant. In the words of Aitken (1982), "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, that is believing oneself to be inadequate and believing the world is too difficult and demanding. Researchers have followed in Ellis and Knaus' footsteps by investigating among

² Though this is the predominant opinion, others argue that this is too simple a depiction. 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.

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 being worried about receiving harsh appraisal (Beck, Koons, & Milgram, 2000; Burka & Yuen, 1984; Ellis & Knaus, 1977; Schlenker & Weigold, 1990).

Hypothesis 8: Procrastination should be positively correlated with irrational beliefs.

Low Self-Efficacy & 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).

Hypothesis 9: Procrastination should be negatively correlated with self-efficacy.

Hypothesis 10: Procrastination should be negatively correlated with self-esteem.

Self-Handicapping

Procrastinators might not feel that their actions will change their situation, and thus they concentrate on managing their emotional reactions to the situation instead. 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 when people place obstacles that hinder their own good performance. The motivation for self-handicapping is often to protect self-esteem by giving people an external reason, an “out,” if they fail to do well (Jones & Berglas, 1978;

Smith, Snyder, & Handelsman, 1982). It is also associated with a diffuse/avoidant identity style (Berzonsky, 1992), a personality type that seeks to avoid relevant information about oneself.

However, it is debatable whether self-handicapping should strictly be considered a form of procrastination. Empirically, Lay, Knish, and Zanatta (1992) found several divergent relationships between self-handicappers and procrastinators. Conceptually, there also appears to be differences. 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, though at the risk of significant shame and humiliation if they fail. Given their “bounded” worldview, albeit perhaps faulty, it is to their benefit not to make an unambiguous bid at succeeding. Their “procrastination” is then done purposefully, to maximize their overall utility. Regardless of one’s opinion on this matter, procrastination and self-handicapping should be at least empirically related.

Hypothesis 11: Procrastination should be positively correlated with self-handicapping.

Depression

Depression, 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), and Costa and McCrae (1992) go so far as to include depression as a facet of neuroticism in their personality scale. Regarding learned helplessness and pessimism, several researchers argue that they 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, they tend to lack energy, and have problems concentrating (*DSM-IV*, 1994), all symptoms that make task completion difficult. In fact, the Beck Depression Inventory (Beck & Beck, 1972) even includes an item reminiscent of procrastination itself: "I put off making decisions more than I used to." Also, as our energy wanes, working apparently becomes painful or more difficult (Baumeister, Heatherton, & Tice, 1994). Similarly, Burka and Yuen (1983) also discuss how it is harder to initiate tasks when we are tired.

Hypothesis 12: Procrastination should be positively correlated with depression.

Openness to Experience: Intelligence/Aptitude

Openness to experience is sometimes referred to 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, it shows the strongest relationship with intelligence and scholastic aptitude (Beier & Ackerman, 2001), which are consequently summarized here. There have yet to be any direct hypotheses between openness or intelligence and procrastination and accordingly, I do not suggest there is any.

Hypothesis 13: Procrastination should be unrelated to openness to experience or intelligence/aptitude.

Agreeableness

According to the clinical literature (Burka & Yuen, 1983; Knaus, 1979), rebelliousness, hostility, and disagreeableness are thought to be major motivations for procrastination. For those with these personality traits, externally imposed schedules are more likely experienced as aversive, and thus avoided. Also, by delaying work and starting it on one's own schedule, autonomy is reasserted. The possibility of this etiology has led to the development of paradoxical treatments, where people are directed to procrastinate and by rebelling against this directive, start work early (e.g., Mulry, Fleming, & Gottschalk, 1994; Shoham-Salomon, Avner, & Neeman, 1989).

Hypothesis 14: Procrastination should be negatively correlated with agreeableness.

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). It is important to note that the exact definition of impulsiveness and its structure wanders somewhat as well as with which personality trait it best represents (Revelle, 1997). Typically, it indicates spontaneity and a tendency to act upon whims and inclinations.

Some aspects of extraversion have already been discussed. Optimism (i.e., pessimism) and energy level are also aspects of depression. These preliminary findings demonstrate some of the complexities of extraversion as procrastination's hypothesized relationships with these facets conflict. Both lethargy and impulsiveness predict procrastination, but the first indicates a lack of extraversion while the second suggests an abundance of the trait. In keeping with this inconsistency, no significant results are expected for extraversion.

Hypothesis 15: Procrastination should not be associated with 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 end up pursuing immediate gratification, neglecting or ignoring longer-term responsibilities.

Hypothesis 16: Procrastination should be positively correlated with impulsiveness.

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 to feel the tension of working close to a deadline. Consequently, their delays may be more purposefully planned than the purely impulsive and 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 (Sommer, 1990; Revelle, 1997), and without it, work could become tedious and sloggish. However, Ainslie (1992) argues that this habit 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.

Hypothesis 17: Procrastination should be positively correlated with sensation-seeking.

Conscientiousness

The connection between conscientiousness and procrastination is very strong. Ones and Viswesvaran (1996) summarize much of work done on conscientiousness, noting that people high in this trait are described as planful, organized, industriousness, persistent, goal-directed, and self-controlled. Consequently, conscientiousness has links to procrastination similar to that of extraversion and positive affect, due to the commonality between healthy levels of energy and industriousness as well as between impulsiveness and self-control. However, conscientiousness' connection to procrastination goes well beyond this, partly because the two constructs show considerable overlap. For example, Costa and McCrae (1992) describe those high in this trait as “sensible and rational in making decisions” (p. 25), while those low in it as “more lackadaisical in working towards their goals” (p. 16).

Hypothesis 18: Procrastination should be negatively correlated with conscientiousness.

Self-Control/Self-Discipline

Focusing on self-control/self-discipline, it primarily reflects organization and energy and does indeed seem to be *the* deciding component of procrastination. By definition, self-discipline is closely related. For example, Costa and McCrae's (1992) self-discipline scale contains several items strongly reminiscent of procrastination itself (e.g., “I waste a lot of time before settling down to work”). Also, strongly related to the trait of self-control is self-regulation. These are collection of skills that deal with better managing one's own behavior (Rachlin, 2000).

Hypothesis 19: Procrastination should be negatively correlated with self-control/self-discipline.

Distractibility

It has long been noted that attention is critical to self-control. Sigmund Freud (1923/1961) and William James (1890) speak to it and other 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 procrastination prevention so that one either fails to encode these cues or limits their processing so that they are not fully valued.

Hypothesis 20: Procrastination should be positively correlated with distractibility.

Organization

Organization refers to a collection of scales that deal with ordering, structuring, and planning one's life. It can reduce procrastination in several ways, such as by assisting goal setting (Locke & Latham, 1990), gap reflection (Oettingen, 1996) or automatic habits that preclude the decision to do otherwise (Bargh & Barndollar, 1996).

Hypothesis 21: Procrastination should be negatively correlated with organization.

Achievement Motivation

Another aspect of conscientiousness that is 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). One way it may affect procrastination is by allowing work to be intrinsically engaging and thus necessarily less aversive.

Hypothesis 22: Procrastination should be negatively correlated with achievement motivation.

Demographics

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

Age

People should procrastinate less as they age and learn. As O'Donoghue and Rabin (1999) conclude, "many people 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 how to avoid procrastination. Ainslie (1992) as well as Baumeister et al. (1994) review considerable research showing people tend to procrastinate less with repeated practice.

Hypothesis 23: Procrastination should decrease with the age of the respondent.

Sex

The expected 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. Consequently, this variable is exploratory.

Year

As mentioned at the start of this paper, Kachgal et al. (2001) believe procrastination is on the rise. Since cohort effects in personality do appear to exist (e.g., Twenge, 2000) and since procrastination may be susceptible to environmental influences (e.g., task aversiveness), this is a definite possibility.

Hypothesis 24: Procrastination should be increasing over time.

Nation

That nations differ in mean personality traits has been well established (Steel & Ones, 2002). Though proper cross-cultural comparison requires a considerable foundation to ensure measurement equivalence, a preliminary investigation is possible. Approximately 88% of all procrastination studies have taken place in two very comparable countries (i.e., minimal translation concerns): Canada and the United States. However, nation is included only as an exploratory variable. It is uncertain whether Canadians or Americans tend to procrastinate more.

Method

Meta-Analytic Method

The summary of the results primarily followed 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. Corrections were employed for dichotomizing a continuous variable, uneven splits, range restriction as well as range *enhancement*, similar to range restriction but where one selects only extreme scores. When a study used multiple measures of procrastination or of another target variable, these were averaged so only one, independent correlation was included in the analysis.

Of note, the confidence interval refers to the precision with which the expected mean effect is measured, and 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 and, in this study, unreliability. To avoid *negative* residual variance (i.e., when expected sampling error is greater than observed variance), this study employs the *Iterative Homogeneity of Variance Index* (IHVI; Steel & Kammeyer-Muller, 2003). For the entire range of possible true population variances, the IHVI iteratively calculates the probability that they may have given rise to the observed variance. Averaging the sum of these probabilities creates an improved, unbiased estimate of observed variance that prevents negative residual variance. In addition, the IHVI technique can provide confidence intervals around the residual variance itself, indicating its likely minimum and maximum amount. This method, instead of the traditional Q statistic, is employed, indicating the percentage of variance likely unexplainable by sampling error and reliability.

Aside from the Iterative Homogeneity of Variance Index, the meta-analytic method used here does differ from Hunter and Schmidt (1990) in one other respect. Their equation for estimating $\hat{\tau}^2$ (i.e., moderator effect, between-studies variance) tends to underestimate as the number of studies decreases (Hall & Brannick, 2002; Steel & Kammeyer-Mueller, 2002; Cornwell & Ladd, 1993). The reason for this bias is primarily due to using the sample-size weighted mean correlation in place of true r , which if 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 obtained 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 typical, r refers to the reliability corrected, sample-size weighted, mean effect size.

Literature Review

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 a copy of it is maintained on-line. Though 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 of: procrastination, dynamic inconsistency, temporal discounting, hyperbolic discounting, and irrational exuberance. Second, the *Social Sciences Citation Index* (i.e., *Web of Science*) was searched for all publications that cited an article regarding procrastination assessment (e.g., the PASS; Solomon & Rothblum, 1984). Third, if an author was found to publish more than one article on procrastination, they were contacted where possible. This was done to better uncover individual research programs on procrastination (i.e., “file drawer” problem). Fourth, once procrastination-focused references were obtained, each publication’s own 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, 438 sources were initially identified for review. After excluding those that mentioned procrastination peripherally or failed to provide data (e.g., counseling case studies of procrastination), this review considers 169 separate works: 8 book chapters, 5 conference proceedings, 2 unpublished papers, 2 electronic sources, 113 journal articles, and 39 theses. In total, 648 correlations were summarized. All studies were double-coded and discrepancies resolved to ensure accuracy.

Moderator Search

Though it is unlikely that all the variance in results can be accounted, 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, though this has been addressed in specific studies (e.g., Steel et al., 2001; Scher & Osterman, 2002) with effects ranging from none to weak depending upon the variable examined. Still, several methodological variables can be considered. As 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. Second, it is also possible that some studies were conducted more carefully than others. The difficulty of estimating study quality is extreme (Wortman, 1994), though as mentioned, most of the results are based on a relatively straightforward correlational design and thus quality is not expected to have a substantial impact. Still, studies were coded as being from journals and non-journals, with the expectation that

journal articles *on-average* are better quality. Also, extreme correlations were examined to determine if they represented outliers, as per Huffcutt and Arthur (1995). Studies that were a full standard deviation larger from the next highest were typically excluded from the analysis, though at times it was possible to check and correct such extreme scores with the lead author. By this way, two typographical errors were detected as 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. There proved to be only one detectable source of variance: the measures employed. Similar, though not identical, indices were grouped together to reduce redundancy. When theory indicates that different scales or tests used may have a significant effect, a moderator search was conducted. Significantly different results ($p < .01$) are reported separately.

There are a variety of techniques for detecting these possible moderators during meta-analysis, though recent work by Steel and Kammeyer-Mueller (2002) indicated 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 is at least five cases (K) per moderator variable. Results are reported where statistically significant ($p < .01$).

Results

The meta-analytic results are divided in the same subsections as that of the literature review: Phenomenology of Procrastination, Task Nature, Individual Differences, and Demographics. These results include experimental findings where available. A summary of the hypotheses can be found in Table 1. Tables 2 and 3 provide the meta-analytic figures.

Phenomenology of Procrastination

There were three hypotheses regarding procrastination's phenomenology: Intention-Action Gap, Mood, and Performance. With the exception of mood, all these findings are summarized meta-analytically in Table 2.

Intention-Action Gap

There is strong confirmation for hypothesis 1. 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 ($r=.06$, $K=6$). 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 2 indicates, dilatory behavior correlates on average .51 with procrastination ($K=15$).

In addition, several researchers investigated this topic by measuring the disparity between intended and actual work habits. As Table 2 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 procrastinators plan their actions (i.e., one week versus two; Steel, 2002b). On the other hand, the gap decreases and even reverses as the deadline begins to loom (Steel et al., 2001). In the final hour, it is the procrastinator who is doing more work than intended.

Mood

The empirical evidence concerning for hypothesis 2 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 they procrastinate regardless of their actual behavior (Carver & Scheier, 1990; Sarason, Sarason, & Pierce, 1990; Stainton, Lay, & Flett, 2000; Steel et al., 2001). More importantly, mood changes and procrastinators may feasibly feel remorse for their inactions at any time, perhaps even after the experimental session or academic semester has ended. Consequently, if we just 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, 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),³ 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 as an increase at the course end (Lay & Schouwenburg, 1993). 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 (2003) based on over 7800 respondents indicates that 94% of them find that procrastination has some negative effect on their happiness with 17% indicating that it is extremely negative.

Other researchers, though, indicate no significant relationship between mood and procrastination. When the state anxiety of students was examined just before and then during exams, no relationship between it and procrastination was detected (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.

Performance

There is moderate support for hypothesis 3. Results, as summarized in Table 2, indicate a weak but consistently negative relationship between GPA and procrastination. The average

³ Unfortunately, this study is less than decisive as they operationalized procrastination as delay in conjunction with negative affect, and 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.

correlation was $-.14$ ($K=15$). As the credibility interval indicates, procrastination is usually harmful, sometimes harmless, but never helpful.

Other performance criteria confirm the dangers of procrastination. Consistently, it shows negative correlations with course GPA, final exam scores, and assignment grades (see Table 2). Moving away from academic indicators, Elliot (2002) investigated the self-reported impact of procrastination on people's health and financial well-being. The negative impact of delays on health and trait procrastination was $-.22$, while for finances it was $-.42$, both statistically significant. Similarly, Mehabrian (2000) found a significant correlation of $-.26$ between career/financial success and procrastination. Notably, evaluation of success was based on peer-not self-report.

Task Nature & 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 is a task, 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 & Punishments

Though there has been research on temporal effects specific to procrastination, it has not been correlational and thus is not summarized meta-analytically. Still, the results do support hypothesis 4. Mazur (1996, 1998) investigated procrastination in animals, finding that pigeons will indeed put off 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 it would diminish as the task nears completion or as a deadline approaches (Strongman & Burt, 2000; Schouwenburg & Groenewoud, 2001).

Task Aversiveness

Hypothesis 5 has received strong support from a variety of research methodologies. To this end, several researchers administered the Procrastination Assessment Scale-Students. Part of it asks respondents to indicate why, out of 26 possible reasons, they might procrastinate 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 a comparable format, Briody (1980), Froelich (1987), and Haycock (1993) found that two top-rated reasons for procrastinating a task were that it was either unpleasant or boring and uninteresting. Using an open-ended format, Ferrari (1993a) elicited a similar reason why people Christmas shopped late. 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 ($r = .44, K=8$). 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 was moderated by conscientiousness, with low conscientiousness apparently increasing the effect

of task pleasantness on procrastination (Lay & Brokenshire, 1997; see also Somers, 1992). Also, the correlation between trait procrastination and finding tasks aversive in general is also strong and stable ($r=.46$, $K=10$). This indicates that one reason why some people procrastinate more is simply because they find more of life's chores and duties aversive.⁴

Finally, several researchers have considered what type of task adversity is best correlated with procrastination. Jobs characterized by lower autonomy, task significance, and feedback were likely to increase decisional procrastination (Lonergan & Maher, 2000), though 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 (Blunt & Pychyl, 2000; Briody, 1980; Haycock, 1993; 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 delayed doing it.

Individual Differences

Individual Differences is the largest of the sections, dealing with the results for 16 hypotheses (i.e., 6 to 22). Tables 2 and 3 meta-analytically summarize all these findings.

Neuroticism

Hypothesis 6 is not supported. This conclusion is reached despite observing a weak positive correlation ($r=.25$, $K=44$). 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 et al., 1990).

⁴ Ottens (1982) makes this observation early on, noting that "procrastinators perceive task situations in such ways so as to exacerbate their aversiveness" (p. 371).

That neuroticism appears to be essentially unrelated to observed procrastination (Steel et al., 2001), 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; also, Johnson & Bloom, 1995), and it added little unique variance over conscientiousness. Support for this conclusion can be found by segmenting the results specific to neuroticism by measure: the EPQ (Eysenck & Eysenck, 1976), 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, 1975). Examining the studies that used the EPQ, BPP, and BFI alone suggests a mean correlation of just .13 while those that used the NEO and EPI suggests a mean correlation of .31 ($F(1,14)=13.95$, $p<.01$).

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 McCown et al.'s original work could be considered anomalous. Second, Blatt and Quinn (1967) argued that procrastination was due to a form of anxiety, specifically 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.

Though clinical work stresses that irrational beliefs are a major source of procrastination, results are irregular and often weak and consequently hypothesis 8 is tentatively rejected. Meta-analytic review indicates its average correlation is .18 ($K=65$). However, significantly weaker as well as stronger results have been obtained with two different specific forms of irrational beliefs.

Using hierarchical regression, self and other perfectionism proved to be much lower ($F(1,103)=47.57, p<.001$). Only socially prescribed perfectionism, where we believe significant others have set standards for us, is even weakly related to procrastination. According to Haycock (1993), only 7% of people 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 reviewed 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 when the perfectionists were also seeking clinical counseling.

Significantly stronger results were obtained with more general irrational belief scales ($F(1,102)=7.10, p<.01$), 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; 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), and a typical item is “Were concerned you wouldn’t meet your own expectations.” Generating a similar finding, though using an open-ended questionnaire, Briody (1980) and Haycock (1993) found 16% and 7% of people gave fear

of failure as a reason, respectively. 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 & low self-esteem.

Both hypotheses 9 and 10 were supported. For self-efficacy, this support was strong with meta-analytic review giving its average correlation as $-.44$ ($K=26$). Also, two other studies support of the importance of self-efficacy. Briody (1980) did find 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 correlation was similarly negative, but weaker at $-.26$ ($K=33$). It is likely that low self-efficacy and self-esteem may decrease the desirability of a given task, which in turn creates procrastination.

Self-handicapping.

Hypothesis 11 is strongly supported. The average correlation between self-handicapping and procrastination is $.45$ ($K=16$). 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 voluntarily entered into conditions or engaged in activities that self-handicapped their performance on evaluative tests (Ferrari, 1991c; Ferrari & Tice, 2000).

Depression.

Hypothesis 12 is moderately supported. As summarized, depression is associated with procrastination, demonstrating an average correlation of .29 ($K=53$). 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 students given for putting off work (Strongman & Burt, 2000), and 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.

Of note, 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. Though the results for pessimism were not significantly different from general depression, Sigall et al.’s (2000) experimental investigation indicates 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 successfully delay their work until later.

Openness to Experience: Intelligence/Aptitude

Hypothesis 13 is supported. Openness to experience shows a scant correlation of .06 ($K=12$) while for intelligence/aptitude, it is even lower at .02 ($K=12$).

Agreeableness

Hypothesis 14 is rejected. Meta-analytically, the average correlation is -.12 ($K=21$). However, Kachgal et al. (2000) and Solomon and Rothblum (1984) did extract a dimension titled “Rebellion against Control” when examining reasons for procrastinating. However, its most

popular item “You resented people setting deadlines for you,” was endorsed by under 5% of respondents.⁵

Extraversion

Hypothesis 15 is supported. The results for extraversion are extremely weak, with a correlation of $-.14$ ($K=21$). Furthermore, findings specific to positive affect may potentially show more consistent results, being that it emphasizes the energy rather than the impulsivity component of extraversion. Accordingly, confining the meta-analysis to positive affect reveals a correlation of $-.22$ ($K=9$), which is significantly stronger ($F(1,23)=10.77$, $p<.01$) than measures specific to trait extraversion ($r=-.10$, $K=15$). On the other hand, there appear to be aspects of extraversion that lead to procrastination. McCown et al. (1989), using principal component 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 that facilitates procrastination is social activities with friends.

Impulsiveness.

Hypothesis 16 is supported. Evidence suggests that impulsiveness plays a solid role in procrastination. As reviewed in Table 3, the average correlation between procrastination and impulsiveness is $.40$ ($K=17$). 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

⁵ Of 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.

procrastination also indicates that typically the decision to procrastinate is impulsive and unplanned (Quarton, 1992).

Sensation-seeking.

Hypothesis 17 is rejected. Evidence suggests that perhaps some procrastination is motivated by sensation-seeking, but not very much. As Table 3 summarizes, the average correlation with procrastination is .18 ($K=9$). An additional finding suggesting sensation-seeking's marginal importance is from Kachgal et al. (2000) and Solomon and Rothblum (1984). They 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."

Conscientiousness

Hypothesis 18 is strongly supported. 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 indicates the average correlation is -.64 ($K=17$). 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.

Hypothesis 19 is strongly supported. Researchers have studied self-discipline using a wide variety of self-control, organization, and planning scales. Results, as reported in Table 3, indicate an average correlation of $-.60$ ($K=18$). 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). Finally, one can also add much of the previously mentioned research pertaining to impulsiveness. Impulsiveness is often considered to be the opposite pole of the self-discipline facet (Ones & Viswevaran, 1996).

Distractibility.

Hypothesis 20 is strongly supported. Results firmly support the importance of distractibility. Its average correlation is large at $.47$ ($K=12$) as well as extremely consistent, as indicated by the credibility intervals. Also, Haycock (1993) identified the availability of distractions as one of the top reasons contributing to procrastination.

Organization.

Hypothesis 21 is strongly supported. As expected, results do indicate that organization is antithetical to procrastination, with an average correlation of $-.38$ ($K=18$).

Achievement motivation.

Hypothesis 22 is strongly supported. Accordingly, 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 or intrinsic motivation has an average correlation of $-.40$ ($K=28$). In addition, Lay's (1987) efforts in typology extracted a type of procrastinator that he termed the "underachiever." However, results are significantly different depending upon whether they deal with need for achievement or intrinsic motivation ($F(1,25)=10.60, p<.01$) Results dealing specifically with need for achievement suggest an even higher correlation of $-.49$ ($K=17$).

Demographics

The demographic analyses are based on aggregating individual level correlations but also include an examination at a group level. Means levels of procrastination were reported for 121 samples, of which 9 were based on unique scales. The remaining 112 used one of six well-validated scales (Steel, 2003) and the analyses are confined to this subset, allowing the statistically control of measurement differences. 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). Of note, though 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 3.

Age

Hypothesis 23 is supported. Initial, uncorrected results are reported in Table 3, showing that indeed procrastination appears to decrease with age ($r=-.15, K=15$). However, these results suffer from extreme range restriction. Correcting with a standard deviation based on those of age 12 and up (i.e., $s = 19.5$ years; US Census Bureau, 2000), the findings become extremely strong,

$r = -.47$. Those in their final years, perhaps because of a common approaching deadline, are putting off very little.

The effect of age on procrastination was also analyzed on a group level. The results, however, were not significant, ($\Delta R^2 = .02$, $F(1,105) = 2.14$, $p = .12$). This failure to replicate may be because range restriction was still intense at the group level, where the average mean age was 22.3 and the standard deviation was 4.38.

Sex

There was no theory to posit a relationship between sex and procrastination, and the results indicate perhaps why. After correcting for uneven splits, men do appear to procrastinate only slightly more than women ($r = -.09$, $K=37$). At a group level, there were 101 samples that reported the percentage of men that comprise the group. Like age, though, the results were not significant at this higher level of analysis ($\Delta R^2 = .02$, $F(1,94) = 1.62$, $p = .21$).

Year

Hypothesis 24 is supported. Publication year for the reported samples spanned almost 25 years, from 1978 to 2002. Using publication year to indicate sample year, two analyses were conducted. First, after controlling for the different procrastination measure, year of publication still has a significant effect ($\Delta R^2 = .03$, $F(1,94) = 3.96$, $p < .05$). Second, if age and sex are also controlled, the effect of year intensifies ($\Delta R^2 = .06$, $F(1,92) = 7.29$, $p < .01$). As suspected, people are reporting more procrastination.

Nation

Though there are differences between Canada and the United States, prevalence of procrastination does not appear to be an identifying quality. Both nations' procrastination are indistinguishable ($\Delta R^2 = .00$, $F(1,91) = .17$, $p = .69$).

Discussion

Efforts to understand procrastination have been intensive, with hundred of studies covering a wide range of situations and variables. Meta-analytic findings here suggest that several suspected causes of procrastination are at best minor or inconsistent players. However, there are several variables that show very strong connections. A motivational theory is briefly put forth to explain these results.

Several characteristics that were thought to give rise to procrastination demonstrate weak relationships. Agreeableness and sensation-seeking generated low correlations, below .20. Also, the relationship between procrastination and neuroticism as well as several of its facets was quite weak, especially if one considers expected method bias (i.e., those in a bad mood are more likely to evaluate themselves harshly). Also, self-handicapping, despite its strong empirical relationship, is conceptually at odds with procrastination. Though people may self-handicap by delaying, the delay is initiated purposefully and thus cannot be easily considered irrational. It is uncertain if self-handicappers truly expect to be worse off.

Still, several other variables were observed to cause or at least correlate with procrastination. We tend to procrastinate when the task is aversive or when rewards rather than punishers are delayed. Also, it is associated at $\pm .40$ or greater with these individual difference variables: self-efficacy, impulsiveness, distractibility, conscientiousness and its facets. Coupled with the intention-action gap and the correlation with age, only one motivational theory can account for all these findings, that is an integration of expectancy theory with a hyperbolic time-discounting function as proposed by several authors (Lowenstein & Prelec, 1992; Rachlin, 1990; Schouwenburg & Groenewoud, 1997).

Essentially, several prominent researchers have noted that a major limitation to expectancy theory is its inability to consider changes over time (Kanfer, 1990; Luce, 1990). To deal with this issue, expectancy theory is combined with hyperbolic discounting to form:

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

This theory is consistent with every strong, empirically observed finding regarding procrastination. 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 Valence (V) should be rarely delayed. According, those who are high in self-efficacy and need for achievement are less likely to procrastinate. Also, valence is expressed in task aversiveness, as we tend to delay unpleasant pursuits. As the denominator of the equation indicates, enjoyable activities that are immediately realizable (D), that is *temptations*, are more highly valued, consistent with findings regarding task delay. Also, Γ refers to the person's sensitivity to delay and the larger Γ becomes, the greater is the sensitivity. 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).

Finally, a necessary outcome of hyperbolic time-discounting is an intention-action gap. (e.g., Lowenstein & 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. Because of this, our original intentions can suddenly change and we find ourselves pursuing smaller but more readily realizable rewards. Also, Green, Fry,

and Myerson (1994) found that temporal discounting tends to decrease with age, just as procrastination does.

Future Research

The topics of research available to fully explore procrastination and its underpinnings are still extensive. The motivational literature has tended not to incorporate the notion of temporal discounting (e.g., Franken, 1994; Kanfer, 1990; Mitchell, 1997), evidently key to understanding procrastination, and thus can only offer limited contributions. Consequently, there is much interesting work to be done in the scientific fundamentals of description and control.

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

Given that the reasons underlying why people procrastinate 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, there appears to be a connection between brain functioning and procrastination. In a recent review by Skolyes and Sagan (2002), they note:

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 this 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 that 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. Within an industrial-organizational context, it is primarily limited to goal setting and to stress coping (Karoly, 1993; Terry, Tonge, & Callan, 1995). However, there are many other methods of regulation that are largely overlooked or their efficacy only vaguely understood. As an initial example, Galué (1990) and Coote-Weymann's (1988) workplace investigations indicate that the most control over procrastination could be achieved by exploiting environmental

contributors. Consequently, we should be able to more easily reduce procrastination by simply adjusting situational aspects, specifically the proximity to temptation and prevalence of stimulus cues. For example, email is definitely a popular avenue of procrastination, with over 90% of college computer users reporting that they use it to irrationally delay (Brackin, Ferguson, Skelly, & Chambliss, 2000). Since its icon is perpetually within the field of view and its access borders on instantaneous, simply making it less visible or delaying access to it should decrease procrastination.

Conclusion

References to procrastination can be found in some of the earliest records available, stretching back at least 3000 years (Steel, 2002). Looking towards tomorrow, procrastination does not appear to be leaving us anytime soon. On the contrary, it and other problems due to temporal discounting appear to be becoming more frequent.

In the workplace, problems due to procrastination and lack of self-control appear to be on the rise as jobs are expected to become increasingly unstructured or at least self-structured (Cascio, 1995; Hunt, 1995). This absence of imposed direction means that the competent worker must create order out of the imminent chaos – he or she must self-manage or self-regulate (Kanfer & Heggestad, 1997). As structure continues to decrease, the opportunity to procrastinate will concomitantly increase. Consumer behavior appears no less susceptible. Examination of credit card purchases revealed about five times as much last-minute Christmas shopping in 1999 as was done in 1991 (“Many Shoppers,” 1999).

Furthermore, the virulence and prevalence of distracting temptations, an enabler of procrastination, also appears to be escalating. As a review by Ainslie (1992) indicates, technological advances are speeding the delivery mechanisms for many of our needs.

Unfortunately, these mechanisms tend to favor substandard experiences that satisfy these needs only weakly. Due to temporal discounting, more satisfying ventures are put aside in favor of these shallow but more immediate options. For example, there is a tendency to passively engage in vicarious entertainment to the exclusion of almost all other life endeavors. By constantly surrounding ourselves with easily available but inferior options, we have done ourselves a disservice. With Clark (1997) ominously extrapolating that this trend could lead to a *dystopia*, convenient access to poorer choices is decidedly inconvenient.

Unfortunately, this future may be difficult to avoid given the basic nature of procrastination, evidently an outcome of a fundamental feature of our motivational landscape. To combat procrastination and our inherent irrationality, we will often need to implement *in advance* self-control mechanisms to limit our choices. Though we do have the capacity to use self-correction and can prepare for our inevitable fallibility, the benefits of these self-control mechanisms are necessarily delayed and thus discounted. Ironically, the more susceptible we become to procrastination, the less likely we will execute a cure.

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Table 1

A Summary of Procrastination Hypotheses and Results

	Variable	Hypothesized Relationship	Results
1	Intention Action Gap	Fail to act on intentions	Strong Support
2	Mood	Worse mood	Mixed
3	Performance	Worse performance	Moderate Support
4	Task Aversiveness	Increases procrastination	Strong Support
5	Task Delay	Increases procrastination	Strong Support
6	Neuroticism	Positive Relationship	Weak Support/Reject
7	Irrational Beliefs	Positive Relationship	Weak Support/Reject
8	Self-Efficacy	Negative Relationship	Strong Support
9	Self-Esteem	Negative Relationship	Moderate Support
10	Self-Handicapping	Positive Relationship	Strong Support*
11	Depression	Positive Relationship	Moderate Support
12	Openness to Experience	No Relationship	Strong Support
13	Intelligence/Aptitude	No Relationship	Strong Support
14	Agreeableness	Negative Relationship	Weak Support/Reject
15	Extraversion	No Relationship	Moderate Support
16	Impulsiveness	Positive Relationship	Strong Support
17	Sensation-Seeking	Positive Relationship	Weak Support/Reject
18	Conscientiousness	Negative Relationship	Strong Support
19	Self-Control	Negative Relationship	Strong Support
20	Distractibility	Positive Relationship	Strong Support
21	Organization	Negative Relationship	Strong Support
22	Achievement Motivation	Negative Relationship	Strong Support
23	Age	Negative Relationship	Strong Support
-	Sex	Exploratory	Men Procrastinate More
24	Year	Procrastination is increasing	Strong Support
-	Nation	Exploratory	Canadians = Americans

Note: Size of support is determined by the strength of correlation and the width of the credibility intervals.

* Despite the observed empirical correlation, delay by self-handicappers is likely intentional and thus not easily considered procrastination.

Table 2
A Meta-Analytic Summary of Procrastination's Correlational Findings

Construct	K	N	\bar{r}	\bar{r} - 95% Interval			r	r - 95% Interval		
				Confidence	Credibility	Residual		Confidence	Credibility	Residual
<u>Phenomenology of Procrastination</u>										
Dilatory Behavior	15	2,681	.51	.46 to .56	.35 to .67	29 to 85%	.63	.56 to .69	.44 to .81	25 to 84%
Intention	6	433	.06	-.13 to .26	-.36 to .49	18 to 94%	.07	-.16 to .31	-.43 to .57	18 to 94%
Intention-Action Gap	6	533	.29	.18 to .40	.08 to .50	2 to 85%	.31	.19 to .44	.09 to .53	2 to 85%
Performance	34	6,295	-.19	-.23 to -.15	-.40 to .02	51 to 82%	-.21	-.26 to -.16	-.44 to .02	50 to 81%
GPA	15	3,220	-.14	-.19 to -.09	-.29 to .00	10 to 79%	-.16	-.22 to -.10	-.32 to .00	10 to 79%
Course GPA	8	1,814	-.26	-.32 to -.19	-.40 to -.12	4 to 85%	-.28	-.35 to -.21	-.43 to -.13	3 to 84%
Final Exam	10	851	-.18	-.33 to -.04	-.59 to .22	48 to 93%	-.20	-.35 to -.05	-.63 to .23	48 to 93%
Assignments	7	1,087	-.31	-.41 to -.21	-.53 to -.09	10 to 91%	-.34	-.45 to -.23	-.58 to -.09	10 to 91%
<u>Task Aversiveness</u>										
Task Procrastination	8	938	.40	.28 to .53	.08 to .73	43 to 94%	.44	.30 to .57	.09 to .78	42 to 94%
Trait Procrastination	10	1,069	.40	.30 to .50	.12 to .67	27 to 89%	.46	.34 to .58	.14 to .78	27 to 89%
<u>Neuroticism</u>										
Neuroticism	44	8,540	.25	.22 to .28	.11 to .39	27 to 69%	.29	.25 to .32	.12 to .45	27 to 69%
EPQ, BPP, & BFI	7	1,590	.13	.05 to .21	-.04 to .30	5 to 88%	.15	.06 to .25	-.04 to .35	5 to 88%
NEO & EPI	11	2,210	.31	.26 to .37	.19 to .44	3 to 77%	.35	.30 to .42	.20 to .51	4 to 80%
All Irrational Beliefs	65	12,072	.18	.15 to .21	-.01 to .36	49 to 75%	.22	.18 to .25	-.01 to .44	49 to 74%
Irrational Beliefs	14	2,384	.27	.19 to .34	.02 to .51	48 to 89%	.35	.25 to .45	.05 to .65	42 to 88%
Fear of Failure ^a	50	9,226	.20	.18 to .23	.07 to .33	22 to 65%	.24	.21 to .27	.08 to .40	23 to 65%
Perfectionism ^b	23	2,970	-.01	-.07 to .05	-.26 to .24	41 to 82%	-.01	-.09 to .07	-.31 to .29	41 to 82%
Self-Efficacy	26	4,217	-.44	-.47 to -.40	-.56 to -.31	12 to 71%	-.55	-.59 to -.51	-.71 to -.39	13 to 71%
Self-Esteem	33	5,846	-.26	-.30 to -.23	-.41 to -.12	22 to 71%	-.31	-.35 to -.27	-.48 to -.14	22 to 71%
Self-Handicapping	16	2,784	.46	.40 to .52	.25 to .66	48 to 88%	.61	.53 to .69	.32 to .89	52 to 89%
Depression	53	10,233	.29	.26 to .32	.11 to .46	47 to 75%	.34	.31 to .38	.13 to .55	48 to 75%

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

^b Includes: Self and Other Perfectionism.

Table 3
 A Meta-Analytic Summary of Procrastination's Correlational Findings

Construct	<i>K</i>	<i>N</i>	\bar{r}	\bar{r} - 95% Interval			<i>r</i>	<i>r</i> - 95% Interval		
				Confidence	Credibility	Residual		Confidence	Credibility	Residual
<u>Openness to Experience</u>										
Openness to Exp.	12	2,823	.06	.01 to .11	-.07 to .19	5 to 79%	.07	.01 to .14	-.08 to .23	5 to 79%
Intelligence/Aptitude	12	1,860	.02	-.05 to .09	-.17 to .22	12 to 83%	.02	-.06 to .11	-.20 to .25	12 to 83%
<u>Agreeableness</u>										
Agreeableness	21	4,350	-.12	-.16 to -.07	-.26 to .03	15 to 76%	-.14	-.19 to -.09	-.32 to .04	16 to 76%
<u>Extraversion</u>										
Extraversion	21	4,287	-.14	-.18 to -.09	-.30 to .03	24 to 78%	-.16	-.21 to -.11	-.35 to .02	21 to 78%
Extraversion	15	3,300	-.10	-.15 to -.06	-.23 to -.02	4 to 75%	-.12	-.18 to -.07	-.26 to .02	4 to 73%
Positive Affect	9	1,840	-.22	-.28 to -.15	-.37 to -.07	5 to 84%	-.25	-.33 to -.18	-.43 to -.07	5 to 85%
Impulsiveness	17	3,190	.40	.34 to .46	.20 to .61	48 to 88%	.51	.44 to .58	.25 to .77	48 to 88%
Sensation-Seeking	9	1,818	.18	.07 to .29	-.13 to .49	57 to 95%	.23	.08 to .37	-.16 to .61	56 to 95%
<u>Conscientiousness</u>										
Conscientiousness	17	3,331	-.64	-.68 to -.60	-.78 to -.49	47 to 87%	-.76	-.81 to -.71	-.93 to -.59	45 to 87%
Self-Control	18	3,877	-.60	-.65 to -.54	-.81 to -.38	67 to 92%	-.77	-.85 to -.70	-.99 to -.46	73 to 93%
Distractibility	12	1,970	.47	.41 to .54	.31 to .64	18 to 85%	.63	.55 to .70	.45 to .80	7 to 81%
Organization	18	3,240	-.38	-.44 to -.32	-.58 to -.18	50 to 87%	-.48	-.55 to -.40	-.77 to -.18	55 to 89%
Achievement Motivat.	28	6,136	-.40	-.47 to -.34	-.75 to -.06	83 to 94%	-.48	-.57 to -.41	-.90 to -.08	83 to 94%
Need for Achiev.	17	3,919	-.49	-.57 to -.42	-.78 to -.20	77 to 95%	-.61	-.69 to -.51	-.94 to -.27	74 to 94%
Intrinsic Motivation	10	1,939	-.27	-.33 to -.20	-.42 to -.11	6 to 84%	-.32	-.40 to -.24	-.49 to -.16	4 to 81%
<u>Demographics</u>										
Age - Uncorrected	15	3,062	-.15	-.21 to -.10	-.32 to .02	19 to 82%	-.16	-.22 to -.10	-.35 to .02	19 to 82%
Age - Corrected	15	3,062	-.47	-.65 to -.30	-.82 to -.13	3 to 73%	-.51	-.70 to -.32	-.88 to -.14	3 to 72%
Sex (M=1, F=2)	37	7,469	-.09	-.13 to -.05	-.30 to .11	48 to 79%	-.10	-.14 to -.06	-.32 to .12	47 to 79%