

The Prevalence, Predictors, Causes, Treatments, and Implications of Procrastination Behaviors in General, Academic, and Work Setting

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Abstract

Procrastination refers to a prevalent self-regulatory failure that alludes to deferring necessary actions required to successfully complete tasks on time, and instead engaging in activities that are more rewarding with short term over long term gains (Aremu, Williams, & Adesina, 2011). Procrastination is identified as one of the least understood minor human miseries and a complex psychological phenomenon that not only leads to psychological distress, but also shows significant links to lower levels of health, wealth, and well-being (Balkis & Duru, 2007; Steel & Ferrari, 2013). Approximately, 20-25% of adult men and women living around the world are indulged in chronic procrastination in various domains like academic, social relationships, professional, and finance management (Balkis & Duru, 2007; Ferrari & Diaz-Morales, 2014). Some of the identified factors closely associated with procrastination include evaluation anxiety, task aversiveness, task delay, low self-efficacy, lack of persistence, dependence, fear of failure, negative evaluation, irrational beliefs, learned helplessness, and perfectionism (Schubert & Stewart, 2000; Steel, 2007; Steel & Ferrari, 2013). Procrastination tendencies also give rise to poor self-esteem, poor self-confidence, anxiety, public and private self-consciousness, and concerns over public image (Ferrari, 2001). The prevalence, predictors, causes, treatments, and implications of procrastination behavioral patterns in general, academic, and work settings are reviewed.

Keywords: anxiety, conscientiousness, distress, ineffective time management, neuroticism, self-regulation, self-efficacy

1. Introduction

Searching for a person who has never been guilty of voluntarily delaying a task to a later date is equivalent to finding a needle in haystack. Most people would agree, either privately or publicly, that they have been guilty of dilly-dallying or procrastinating at least a few times in their life. Procrastination is derived from Latin verbs, “pro” refers to forward motion and “crastinus” refers to belonging to tomorrow (Ferrari, Johnson, & McCown, 1995). Procrastination is defined as a purposeful voluntary delay in beginning or finishing a task until the last minute or after the predetermined deadline, or indefinitely that would have been ideally completed in the present time (Freeman, Cox-Fuenzalida, & Stoltenberg, 2011; Gupta, Hershey, & Gaur, 2012; Rozental & Carlbring, 2013; Steel, 2007). Procrastination is also identified as a behavioral pattern that leads to ineffective time management, reduced performance levels, delayed study behaviors, lowered levels of frustration tolerance, maintaining task avoidance, ego depletion, speed-accuracy tradeoffs, and an inability to regulate negative emotions (Ferrari & Diaz-Morales, 2014; Schubert & Stewart, 2000). The five identified categories of procrastination behavior include (i) life routine procrastination, (ii) decisional procrastination, (iii) neurotic procrastination, (iv) compulsive procrastination, and (v) academic procrastination (Balkis & Duru, 2007).

Procrastination is not a new phenomenon and comparable constructs have been reported throughout history; nevertheless, those constructs had different and less negative connotations (Ferrari et al., 1995). Steel and Ferrari (2013) note that, in recent years, the incidence of procrastination has mounted with many people admitting to varying degrees of procrastination. Procrastination is deemed as extreme when people are delinquent in visiting a doctor or getting treatment done for ailments, until treatment is no longer an option (Steel & Ferrari, 2013). Procrastinators are not only unable to manage time wisely, but also are uncertain about priorities, goals, and objectives; thereby, neglecting attending to necessary responsibilities in a timely fashion despite of good

intentions or inevitable negative consequences (Balkis & Duru, 2007). Procrastination and poor performance are strongly connected because procrastinators make more errors, work slower, and miss more deadlines as compared to non-procrastinators; therefore, the myth that procrastinators work best under time pressure is confronted (Skowronski & Mirowska, 2013). A person manifesting high procrastination may lose work, drop out of school, and may jeopardize his/her marital life (Balkis & Duru, 2007). It is interesting to note that people who consider themselves as procrastinators often intend to reduce their behavioral delay by setting realistic goals and keeping acceptable time frames for task completion (Gupta et al., 2012). Notwithstanding the negative connotation attached to procrastination, Skowronski and Mirowska (2013) suggest that procrastination may work in certain circumstances where time pressure created by postponing a task may actualize as a challenge begetting energized performance while also mitigating boredom. Students also use procrastination as a way of balancing between social and academic activities, adjusting their study schedule to work in study groups, or creating time pressure for motivational purposes (Skowronski & Mirowska, 2013).

2. Academic Procrastination

Milgram and Marshevsky (1995) report that academic procrastination is considered an endemic problem among college students, which has received increased research and professional interest than other types of procrastination such as decisional, neurotic, and life-routine procrastination. Academic procrastination is defined as involving both behavioral delay and personal discomfort or upset about the delay (Milgram & Marshevsky, 1995). The prevalence of procrastination among college students is estimated to be 80% and is also reported to be one of the most common problems among post-secondary students varying in estimates from 10% to 70% (Schubert & Stewart, 2000, Steel & Ferrari, 2013). Additionally, results from a general population survey suggests that approximately one third of people recognize procrastination as a major problem in their educational endeavors (Steel & Ferrari, 2013). Prevalence of academic procrastination in American college students was reported to be 95%; while survey results also yielded that 46% of students reported procrastination on academic tasks at least half of the time (Balkis & Duru, 2007). Student procrastinators postpone academic assignments and instead focus on unproductive activities that lead to lowered performance as well as negative emotional reactions, which eventually negatively affect their academic achievement (Schubert & Stewart, 2000).

3. Workplace Procrastination

Procrastination at workplace is often considered a sub-optimal behavior that increases employer costs due to sapped individual and organizational productivity (Gupta et al., 2012). Nguyen, Steel, and Ferrari (2013) report a negative association between procrastination and workplace values. Procrastination approximately consumes more than one fourth of most people's working days, which in turn cost employers an estimated \$10,000 per employee per year. Nguyen et al. investigated procrastination at an occupational level and found consistent support for the gravitational hypothesis suggesting that employers are less likely to retain procrastinators for jobs requiring high motivation. Procrastinators also tend to keep jobs that are compatible with their self-disciplinary behaviors, as well as those jobs that do not require definitive work styles such as social influence requiring energy, conscientiousness requiring dependability, achievement requiring planning, and adjustment requiring self-control. Thus, procrastinators tend to work in jobs that are lower in inherent rewarding attributes, that is, those providing less motivation while also fostering procrastination (Nguyen et al., 2013).

Gupta et al. (2012) refer to three major dimension that influence work place procrastination including intrapersonal factors, situational factors, and task characteristics. The first dimension is related to one's personality. Numerous studies have shown that neuroticism is positively associated with procrastination; whereas, conscientiousness is negatively associated with procrastination. The second major dimension is based on situational factors suggesting that procrastination behaviors may be due to some situations beyond one's control like ill health or a family problem that leads a non-procrastinator to delay tasks. The third major dimension is related to task characteristics, for example, employees may demonstrate procrastination when they face tasks that are impossible to achieve or have no clearly set dead line for completion (Gupta et al., 2012).

Skowronski and Mirowska (2013) inform about the effects of procrastination on group behaviors. They suggest that delaying behaviors not only negatively influence group morale and group cohesion, but also negatively affect the whole group through second-hand procrastination. Consequently, the co-worker have to bear the consequences of delayed task completion and work harder to make up for loss productivity. Skowronski and Mirowska report a group study where employees were asked to evaluate various hypothetical work place procrastination scenarios. The results produced overwhelmingly negative responses towards fictional procrastinating colleagues. Interestingly, employees who self-identified themselves as procrastinators gave harshest opinions against fictional procrastinators. Therefore, it appears that procrastinators see their delaying

behaviors as inappropriate, problematic, and in need of change (Skowronski & Mirowska, 2013).

The relationship between procrastination and workplace variables was investigated by Nguyen et al. (2013) through an internet survey conducted on 22,053 individuals. Their survey included questions related to gender, employment status, employment duration, income, occupational attainment, and degree of procrastination. The results indicated that high levels of procrastination is linked with low salaries and short employment durations along with a greater chance of being either unemployed or under employed instead of working full time. Procrastination also moderated the relationship between gender and work place variables such that women reported less procrastination, which also gave them an edge over men in the workforce (Nguyen et al., 2013).

4. Chronic Procrastination

Chronic procrastination is a deliberate and repetitive postponement of either starting or finishing a task such that the delay leads to subjective discomfort (Ferrari, 2010). Conceptually, chronic procrastination is a self-regulatory failure that serves as a handicap such that procrastinators fail to steer their goal-directed activities toward healthy lifestyles (Ferrari & Díaz-Morales, 2014). Moreover, chronic procrastination can also denote chronic stress (Burka & Yuen, 2008). Ferrari (2001) notes that self reported chronic procrastinators engage in delaying behaviors by strategically managing their impression, acting in a perfectionist manner, and suggesting severe reprimands for peers who demonstrate poor task performance. They also spend less time in task preparation, task research, and underestimate the time needed for timely task completion. Furthermore, chronic procrastinators maintain negative expectations about their present and future task performance and often choose environmental obstacles that hamper timely task completion just to protect their self/social-esteems and also to avoid blame (Ferrari, 2001). Furthermore, chronic procrastinators report higher levels of stress and anxiety, weak impulse control, lack of work discipline, lack of persistence, an inability to work methodically, lack of time management skill, and also suffer poor health due to the stress caused by working too close to deadlines (Ferrari, 2001; Ferrari & Díaz-Morales, 2014). Ferrari (2001) further reports a series of studies where the effects of cognitive load, objective self-awareness, and time limitation on self-regulation of performance, speed, and accuracy were explored in a sample of procrastinators and non-procrastinators. The results suggested that when participants worked “under pressure” (operationally defined as high cognitive load, objective self-awareness, and self imposed time limitations), the chronic procrastinators ineffectively controlled their performance, speed, and accuracy as compared to non-procrastinators (Ferrari, 2001).

5. Common Causes of Procrastination

According to Balkis and Duru (2007), several possible causes of procrastination behaviors have been revealed through research, which include poor time management, feelings of being overwhelmed, lack of motivation, lack of organizational skills, inability to concentrate on work, fear and anxiety related to failure, negative beliefs about one’s capabilities, personal problems, unrealistic expectations, and perfectionism. Furthermore, procrastination is also considered being rooted in three basic cognitive styles that involve unrealistic views about self, others, and the world. These cognitive styles include: self-downing (negative and disparaging self talk), low frustration tolerance, and hostility. Cognitive variables that correlate with procrastination include irrational beliefs, external attribution styles, and beliefs with regards to time. Increased procrastination in everyday non-academic activities is significantly predicted by high anxiety and low self-efficacy (Balkis & Duru, 2007). Additionally, procrastination may also be viewed as a coping mechanism that is used to conserve the feelings of self-worth (Schubert & Stewart, 2000).

6. Predictors of Procrastination

The link between procrastination and predictor variables was explored in various research studies (Steel, 2007; Steel & Ferrari, 2013). Some of these predictors include sex, age, education, marital status, culture/nationhood, personality, genetic and neurobiological factors, conscientiousness with its facets of self-control, achievement motivation, distractibility, organization, etc. Steel and Ferrari (2013) suggest that a prototypical procrastinator is an urban young man who dropped out of school and belongs to a country where low self-discipline is reported. Furthermore, on reaching adulthood such a man would more likely stay single or separated rather than staying in a committed relationship and also postpone having kids.

The epidemiological international web based study by Steel and Ferrari (2013) surveyed 16,413 English-speaking adults (58.3% women; 41.7% men: $M_{age}=38.3$ years, $SD=14$) to ascertain various characteristics of prototypical procrastinators based on relevant self-reported demographic variables such as sex, age, marital status, family size, education, community location, and national origin. Procrastination tendencies were mostly linked with sex, age, marital status, education, and nationality. The survey results indicated procrastinators to be young single men with lower education levels and residing in countries with reported lower

levels of self-discipline (Steel & Ferrari, 2013).

The interplay of education and gender with procrastination. Steel and Ferrari (2013) inform that men are reported to procrastinate more than women because the identified key determinants of procrastination including higher levels of impulsiveness and lower levels of self-control are found to be more prevalent in men than women. The mediating role of procrastination in the relationship between education and gender was explored in various studies. For example, research conducted on Turkish adults indicated that people with higher education levels reported low procrastination. Also, men were found to lag behind women academically due to lower self-regulatory skills. This relationship causally contributed to the educational gap between men and women; women earned majority of university degrees and were far more likely to graduate than men (Steel & Ferrari, 2013).

Steel and Ferrari (2013) cite result of the 2009 US Census Bureau survey that indicates that 55% of 18 to 29 years old graduates that earned a bachelor's degree or higher were women. They also report that in Belgian universities, men again showed less success rate in earning degrees than women with procrastination being one of the explanatory contributing factors. Men's lower ability to succeed academically is associated partly with their poorer self-regulatory skills, specifically their inclination towards procrastination. Other studies on kindergarten to grade 12 age group suggest that a higher prevalence of behavioral problems among boys may also be responsible for their low success rate in college and women's lead in college (Steel & Ferrari, 2013).

Age and procrastination. Developmentally, the prevalence of procrastination rises significantly during the four years of undergraduate schooling and seems to peak in the mid-twenties (Schubert & Stewart, 2000). Steel and Ferrari (2013) report studies that point to a strong negative relationship between conscientiousness and procrastination, and also between age and procrastination. With growing age and maturity, conscientiousness increases and the neurobiological development reaches completion; while on the other hand, young people lack self-control and show low conscientiousness due to still developing prefrontal cortex (Steel & Ferrari, 2013).

Marital status and procrastination. Results from an epidemiological study by Steel and Ferrari (2013) indicate that procrastination has a strong relationship with marital status as procrastinators show a high tendency of putting off starting and ending relationships. It is estimated from a general survey result that 24% of self-reported procrastinators have been in a substantial problem regarding romance including delaying asking someone out and/or about ending a relationship (Steel & Ferrari, 2013). Research examining marital status and family size achieved mixed results; procrastination may show up in putting off having kids or it may also be a cause of delay in using effective birth control. Furthermore, lack of conscientiousness and impulsivity are also associated with unplanned pregnancies and/or risky sexual behavior (Steel & Ferrari, 2013).

Personality correlates of procrastination. Steel and Ferrari (2013) report that procrastination can be examined not only at a state or behavioral level, but also can be studied as an enduring personality attribute. Generally, personality is found to mediate the stress process beginning from the assessment of stress experience to the choice of coping strategies and lastly to the emotional outcome or affect (Abbasi, 2011). Researchers identify procrastination as a dispositional trait that has cognitive, behavioral, and emotional components (Aremu et al., 2011; Schubert & Stewart, 2000). The most identified personality traits linked to procrastination reported by psychotherapists include fear of failure, passive-aggression orientation, task aversiveness, and low frustration tolerance (Milgram, 1987).

With regards to an association between procrastination and the Five-Factor Model of Personality, literature suggests that procrastination is consistently related with two major underlying personality types namely neuroticism and conscientiousness (Balkis & Duru, 2007; Schubert & Stewart, 2000). Procrastination is positively correlated with neuroticism, perfectionism, and has a strong inverse relationship with conscientiousness (Balkis & Duru, 2007; Milgram & Tenne, 2000; Schubert & Stewart, 2000). These personality factors influence the procrastinator's need to protect academic self-concepts leading to varying styles of procrastination (Schubert & Stewart, 2000). Moreover, decisional procrastination is found to be associated with neuroticism; while, task avoidance procrastination is linked with conscientiousness (Milgram & Tenne, 2000).

Steel and Ferrari (2013) cite results from a meta-analytic and theoretical review on procrastination suggesting that procrastination is a personality trait that shows moderate to strong correlations with personality traits such as impulsiveness and also conscientiousness. Strong associations are found between procrastination and lack of persistence, low conscientiousness, and high impulsiveness. Conscientiousness that refers to a person's self discipline, organization, and need for achievement is a stronger personality predictor of academic performance even when compared with intelligence (Steel & Ferrari, 2013). Also at the work place, job performance is predicted by conscientiousness, which is significantly associated with job search attitude and employment end

result (Nguyen et al., 2013).

Aremu et al. (2011) report that procrastinators are publicly self-conscious and highly self-critical along with lacking self-efficacy and self-esteem. They conducted a study to explore the influence of academic procrastination and personality types on the academic achievement and efficacy of 200 in-school adolescents in Ibadan, Oyo state. The results revealed that extraversion, openness to experience, agreeableness, and conscientiousness are not only positively linked, but also predicted academic achievement and efficacy of adolescents in the study (Aremu et al., 2011).

Neurobiological correlates of procrastination. The research that examined the neurobiological basis of procrastination revealed an interplay between limbic system and prefrontal cortex (Steel & Ferrari, 2013). Procrastination also shares some attributes with attention deficit hyperactivity disorder (ADHD), which include distractibility and disorganization; therefore, procrastination is often considered a symptom of ADHD (Nguyen et al., 2013). Burka and Yuen (2008) note that the prefrontal cortex controls brain's executive functions such as attention-control, cognitive flexibility, information processing, and goal setting. A person with poor executive function capacities may face many challenges and struggle with procrastination despite possessing other mental strengths. Burka and Yuen emphasize that acting in harmony with body's natural rhythms such as circadian rhythms, hormonal rhythms, and the need for quiet versus social time is helpful in boosting performance; while, fighting against the natural body rhythms may lead to procrastination.

7. Implications of Procrastination Behaviors

Burka and Yuen (2008) inform that procrastination can produce stress, and stress can also produce procrastination. The transactional stress theory suggests that stress is neither grounded in the environment nor in the person, but is a reaction of their ongoing transaction (Abbasi, 2011). According to Ferrari and Díaz-Morales (2014), various studies have linked procrastination with negative physical and mental health outcomes and also with greater stress vulnerability. Procrastination is a behavioral pattern that is mediated by a behavioral pathway such that poor health of procrastinators is a result of stress caused by procrastination, their use of ineffective coping style, and also putting off important health behaviors (Ferrari & Díaz-Morales, 2014). Holden (1997) suggests that procrastination in all of its manifestations is a maladaptive way of coping with life stressors. Rozental and Carlbring (2013) report that approximately half of the student population and 15%-20% of the adult population are considered having significant difficulties from chronic and recurrent procrastination, in their everyday life. Balkis and Duru (2007) report that high procrastinators experience increased psychological distress as the deadlines approach due to the lack of sense of self-perceived personal ability, lack of sense of personal control, and self-worth. Procrastination is associated with negative effects such as low grades, low self-esteem, low self-discipline, and low self-efficacy; as well as ineffective learning skills, fear of failure, irrational thinking, cheating, ineffective time management, instant gratification, boredom, anxiety, and depression (Balkis & Duru, 2007).

In a study, Ferrari and Díaz-Morales (2014) recruited 104 psychology students in Spain and administered a survey comprising of Spanish version of the measure of coping behavior linked to mental health along with a procrastination inventory involving various everyday situations. The results indicated that procrastinators reported significantly lower positive actions as well as lower expressions of feelings and needs than non-procrastinators. Ferrari and Díaz-Morales concluded that chronic procrastination might impact mental/physical health due to greater perceived stress, negative and ineffective coping behaviors, and omission of important adjustment behaviors. Holden (1997) cites a series of research studies and informs that procrastinators suffer more stress and report greater health problems. In one study, 44 health psychology students were given daily-symptom checklists and weekly measures of stress and work requirements for a month. The self-reported procrastinators handed in their course papers later than non-procrastinators and also received lower grades. Moreover, in another study involving 60 students, procrastinators experienced more stress and reported more health symptoms such as colds and flu at the end of term. Nevertheless, procrastination works to some extent because procrastinators apparently reported less stress and fewer health symptoms earlier in the term, than those students who worked hard from the start (Holden, 1997).

According to Skowronski and Mirowska (2013), procrastination is particularly problematic in the work environment where timely performance is usually required; thus, employers face real financial consequences when their employees squander the most important and scarce resource such as time. Gupta et al. (2012) add that procrastination is negatively associated with willingness to enroll in job enrichment programs and procrastinators tend to be less efficient and show less commitment for job search behaviors. Furthermore, employees who procrastinate are more prone to be agitated, anxious, disheartened, and gloomy in the long run (Gupta et al.,

2012). Also, putting off planning for retirement and/or initiating personal retirement plans can have far reaching implications on people's financial security (Steel & Ferrari, 2013).

8. Treatment

Various treatment methods are adopted to minimize the damage caused by procrastination behaviors in work, academic, and home environments (Ferrari, 2001). Rozental and Carlbring (2013) report that procrastination is associated with psychological distress and causes psychological suffering, nevertheless it is still not considered a psychiatric condition. However, due to the apparent link between procrastination and a variety of societal problems, it becomes crucial to identify risk factors and at risk populations to help carve out preventative public policy (Steel & Ferrari, 2013).

Ramsay (2002) lays down specific clinical strategies for conceptualizing procrastination and avoidant behaviors that uses case conceptualization to understand patient's difficulties, appraising the patient's readiness for change, and setting up realistic goals. Traditional cognitive therapy (CT) identifies people's distorted cognitions by helping them in reassessing their circumstances, while also modifying their misconceptions and faulty informational processing (Ramsay, 2002). Balkis and Duru (2007) inform that treatment methods showing improvements with procrastination behaviors include general counseling and psychotherapy techniques. Also, other more specific behavioral and cognitive-behavioral techniques including systematic desensitization, relaxation training, rational emotive therapy, and stress inoculation training showed better results in reducing procrastination (Balkis & Duru, 2007).

Rozental and Carlbring (2013), report that cognitive behavior therapy (CBT) is considered the treatment of choice for procrastination even with lack of clinical trials supporting its effectiveness. The presumption that CBT may be beneficial in combating procrastination is primarily based on face validity and single case studies. Cognitive therapy techniques are used to focus on changing the rigid and dysfunctional thought patterns and pair them with behavioral techniques that facilitate re-evaluation of work methods and assumption about one's ability to achieve certain goals. Other cognitive and behavioral techniques that work well with psychiatric disorders are also utilized in treating procrastinators, such as behavioral activation. Behavioral activation is often employed in situations where distress and decreased well-being is remarkable due to a high degree of avoidance. This technique teaches individuals to change delaying behavioral patterns so that tasks and commitments are addressed rather than avoided because procrastination is often reinforced by an unwillingness to experience distress; therefore graded exposure to avoided task is required to change the behavior pattern (Rozental & Carlbring, 2013).

In academic settings, some common core strategies that help in reducing academic procrastination include structured goal setting, breaking assignments down, and changing cognitive styles such as perfectionism and fears of failure or success (Balkis & Duru, 2007). Rozental and Carlbring (2013) cite recent research findings in cognitive neuroscience and industrial psychology that promote the importance of stimulus control that allows forming an effective work environment inhibiting multitasking, reducing the number of distractions, and preventing ego-depletion. Stimulus control is proven effective with people who are easily distracted by environmental stimuli causing anxiety due to unfinished tasks. Other interventions that may also work for people suffering from procrastination include addressing values and rewards, obtaining stimulus control, raising goal-setting skills, and employing success-spirals (Rozental & Carlbring, 2013).

9. Conclusion and Future Directions

Procrastination is pervasive and people suffer from it at varying degrees with visible negative consequences appearing in many facets of life such as academics, work place, marriage, social relations, and financial management. Procrastinators avoid tasks and commitments that they see as unpleasant and also do not accept blame for the delay by justifying it with excuses. Procrastinators hold unrealistic expectations, lack effective time management, and organizational skills that cause anxiety and fear about the task at hand, leading to negative beliefs about their personal and professional capabilities. On the whole, procrastination is seen as a self-perceived problem that negatively affects people's general, social, academic, professional, and marital life.

Due to widely accepted prevalence and potential implications of procrastination in academic, work, and general settings, it is crucial to systematically explore and understand procrastination behavioral patterns and devise effective treatment methods to reduce their negative effects on people's lives. Future studies may explore the potential role of climate and weather conditions on delaying behaviors. Exploring the influence of other environmental characteristics such as illumination, space, and sound present at the work place can provide a better understanding of the contributing factors. Moreover, exploring the types of food consumed by people who are habitual procrastinators may also give useful insights into how delaying behaviors get nourished by

consumed food. Future research may explore new treatment methods as well as preventative measures to help people develop good work habits and live meaningful lives.

Previous research suggests that professionally skilled employees (white-collar workers) demonstrate higher procrastination than middle to lower-class unskilled employees (blue-collar workers) (Gupta et al., 2012). Ferrari et al. (1995) report that in societies with higher industrialization, procrastination becomes more prominent as compared to less industrialized societies. One reason may be that skilled workers enjoy greater access to smart phones and computers, making them more susceptible to distractions. With the advent of social media and its incessant distractions, treatment options may include running workshops to educate people about the nuisance cost of a “tweet” or a “like” during work hours. Therefore, information sharing may be key to reducing first and second hand procrastination. Also, blocking distractions by installing effective softwares on work computers and internet connections may reduce the cognitive load on employees and provide them with greater mental freedom to work. There are some applications that claim to help increase productivity and curb delaying behaviors. Some of them are available for Android and Apple user including “iprocrastinate”, “procraster”, “do it”, “due”, “priorities”, etc. These applications can be further improved based on assessment and evaluations from procrastinators in order to determine what works best for them.

For preventive measures, future studies may explore ties of parental upbringing and later adult delaying behaviors. Longitudinal studies comprised of both parents and children can give a clear picture of the familial roots of procrastination. Procrastination can surface growing up in a family that doubts children’s ability to achieve their targets and also is demanding at the same time (Burka & Yuen, 1983). Notwithstanding that an estimated 22% of variation in the procrastination trait is linked with genetic factors (Steel & Ferrari, 2013), it is worth exploring if procrastination can be instilled or imposed by innocuous parental behaviors. For example, investigating that role of incessant parental demands of taking “rest” and to “finish up later” may be useful in designing meaningful preventative measures. Researchers may also investigate if demanding responsibility at an early age and offering purposeful periodical tasks can lower procrastination behaviors. The cultural aspect of procrastination may also be explored as different nations vary on levels of procrastination based on self-reported accounts of self-discipline (conscientiousness) (Steel & Ferrari, 2013). As the axiom suggests, “old habits die hard”, the best way to avoid raising future procrastinators may be by educating parents, teachers, and children about the pros and cons of delaying behaviors so that delaying habits are crushed before they develop.

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