Understanding Academic Procrastination: A Longitudinal Analysis of

Procrastination and Emotions in Undergraduate and Graduate Students

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Table of Contents

List of Tables

List of Figures

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Abstract

Academic procrastination is defined as the needless postponement of academic tasks despite the expectation of negative consequences, with over 46% of undergraduate students, and 60% of graduate students, engaging in this behaviour (Onweugbuzie, 2004; Senécal, Julian, & Guay, 2003; Solomon & Rothblum, 1984). A review of the research literature on academic procrastination showed a lack of research to date on the directionality of the relationship between academic procrastination and academic emotions so as to determine whether students' emotional experiences are best understood as influencing/being influenced by their procrastination, or if a bidirectional relationship exists. The present three-phase studies examined the frequency of procrastination behaviours, valence of relations between academic procrastination and learning-specific emotions, and how these variables predict one another over time for both undergraduate and graduate students. Beyond findings showing expected valences of relations between procrastination and positive emotions (enjoyment, hope, pride) and negative emotions (anger, anxiety, shame, hopelessness, boredom, guilt), cross-lagged structural equation models showed various directional relations between procrastination and emotions over time. More specifically, procrastination was found to predict specific emotions (e.g., undergraduates: anger; graduate students: boredom), specific emotions were found to predict procrastination levels (e.g., undergraduates: anxiety; graduate students: hope), and bidirectional relations between procrastination and learning-related emotions were also observed (e.g., graduate students: enjoyment, anxiety, and guilt). Implications for future research on academic procrastination and remedial procrastination interventions for students are discussed.

Résumé

La procrastination académique est définie comme le report inutile de tâches académiques avec des conséquences négatives: plus de 46% des étudiants de premier cycle et 60% des étudiants de deuxième et troisième cycles ont ce comportement (Onweugbuzie, 2004; Senécal, Julian, & Guay, 2003; Solomon & Rothblum, 1984). Une revue de la littérature scientifique sur la procrastination académique a montré un manque de recherche sur la directionnalité de la relation entre la procrastination académique et les émotions académiques et si une relation bidirectionnelle existe. Les présentes études en trois phases ont examiné la fréquence des comportements de procrastination, la validité des relations entre la procrastination académique et des émotions spécifiques à l'apprentissage, ainsi que la manière dont ces variables se prédisent au fil du temps pour les étudiants de premier cycle et des cycles supérieurs. Au-delà des résultats montrant des relations attendues entre la procrastination et des émotions positives (joie, espoir, fierté) et des émotions négatives (colère, anxiété, honte, désespoir, ennui, culpabilité), des modèles d'équation structurelle décalés ont démontré des relations directionnelles variées entre la procrastination et les émotions avec le temps. Plus spécifiquement, la procrastination s'est révélée être un prédicteur de certaines émotions (par exemple, étudiants de premier cycle: colère, étudiants diplômés: ennui), les émotions se sont révélées être des prédicteurs de la procrastination (par exemple, étudiants de premier cycle: anxiété; étudiants diplômés: espoir), et des relations bidirectionnelles sont observées entres certaines émotions et la procrastination (par exemple, étudiants diplômés: plaisir, anxiété et culpabilité). Les implications pour les recherches futures sur la procrastination en milieu universitaire et les mesures correctives sont discutées.

Introduction

Procrastination is commonly understood as a weakness of will and involves acting against one's own better judgement by failing to follow a planned course of action (Pychyl, 2011; Searle, 2001). Edward Young once wrote, "procrastination is the thief of time" (Young, 1743, p. 13), alluding to the Latin root of the word "procrastination" as combining *pro,* meaning "in favor of," and *crastinus*, meaning "of tomorrow" (Klein, 1971, as cited in Steel, 2007, p. 66). Whereas procrastination is an occasional incident for some individuals, it can pose a chronic problem for others (Balkis & Duru, 2007; Pychyl, 2013). In the general population, about 20% of individuals have been found to engage in procrastination (Harriott & Ferrari, 1996), with research showing a significant proportion of students to procrastinate on academic tasks (23% of North American pre-service teachers, Balkis & Duru, 2009; 28%-46% of North American undergraduate students, Solomon & Rothblum, 1984; 52% of Turkish undergraduate students, Özer, Demir, & Ferrari, 2009; 39%-60% of North American graduate students, Onweugbuzie, 2004). More specifically, students regularly report procrastinating on academic tasks (e.g., writing term papers, preparing for exams, and keeping up with their weekly readings, Soloman & Rothblum 1984), for at least 1-2 hours a day, with findings showing 25% of undergraduate students to further report that their procrastination negatively affects their academic performance (Klassen, Krawchuk, & Rajani, 2008).

Academic procrastination corresponds positively with trait procrastination in undergraduates (e.g., Krause & Freund, 2014) and has been described by researchers as a failed "should-want" conflict in which students act in accordance with what they want to do, instead of what they should be doing (Bazerman, Tenbrunsel, & Wade-Benzoni, 1998). Instead of working on their academic assignments, students opt to eat, sleep, watch television, or play games

(Klassen, Ang, Chong, Krawchuk, Huan, Wong, & Yeo, 2010; Pychyl, Lee, Thibodeau, & Blunt, 2000). Accordingly, students who are most undesirably affected by procrastination allocate too much time to the "wrong tasks" (i.e., more time on appealing, less beneficial tasks) and postpone the "right tasks" (i.e., long-term, productive tasks; Klassen et al., 2008).

With respect to the types of academic tasks that students procrastinate on, Solomon and Rothblum (1984) found that undergraduates reported the highest procrastination when writing papers (46%), preparing for exams (28%), and doing weekly readings (30%). These results are similar to findings with graduate students who report procrastinating on writing term papers (42%), studying for exams (39%), and doing weekly readings (60%, Onwuegbuzie, 2004). Both populations also consistently report procrastination on writing term papers, studying for exams, and keeping up with weekly readings as problematic (e.g., undergraduate/graduate students: 24%/24%, 21%/22%, 24%/42%, respectively), and wish to reduce their procrastination on these academic tasks (e.g., undergraduate/graduate students: 65%/65%, 62%/68%, 55%/72%, respectively; Onwuegbuzie, 2004; Solomon & Rothblum, 1984), with other findings from Grunschel and Schopenhauer (2015) showing 35% of undergraduates to report a desire to decrease their overall procrastination inclinations. Taken together, existing research suggests that both undergraduate and graduate students frequently procrastinate on educational tasks, see their procrastination as problematic, and wish to reduce their procrastination on these tasks. As such, research geared towards better understanding the causes and implications of academic procrastination are of critical importance for assessing and improving student motivation and performance in higher education.

Procrastination is conventionally depicted as a maladaptive behaviour having negative ramifications with respect to students' academic performance (e.g., test performance; Moon &

Illingwroth, 2005), and health (e.g., visits to health care professionals, Tice & Baumeister, 1997). Moreover, not only has procrastination been linked to negative academic outcomes, it is also correlated with problematic psychological variables including personality traits (e.g., neuroticism, Hess, Sherman, & Goodman, 2000; perfectionism, Flett, Blankstein, Hewitt, & Koledi, 1992), demotivation (Klassen et al., 2008; Patrzek, Grunschel, & Fries, 2012; Steel, 2007), and negative emotions such as anxiety (Beswick, Rothblum, & Mann, 1988; Saddler & Buley, 1999; Solomon & Rothblum, 1984), shame (Fee & Tangney, 2000), guilt (Pychyl, Lee, et al., 2000), and boredom (Blunt & Pychyl, 1998). Academic procrastination is additionally found to relate to critical social-environmental factors such as task aversiveness (Steel, 2007).

Theoretically, procrastination has been proposed to consist of a multifaceted interaction between cognitive (e.g., irrational beliefs), behavioural (e.g., delay behaviours), and affective mechanisms (e.g., anxiety; Solomon & Rothblum, 1984). Nevertheless, despite existing research showing clear empirical relations between procrastination and emotions, several gaps exist in the current empirical and theoretical literature on academic procrastination with respect to its affective elements. More specifically, a large volume of research on the affective components of procrastination has concentrated on the function of anxiety in both undergraduate students (e.g., trait anxiety, Glick, Millstein, & Orsillo, 2014; Solomon & Rothblum 1984; general anxiety, Constantin, English, & Mazmanian, 2018; writing anxiety, Fritzsche, Young, & Hickson, 2003; statistics anxiety, Macher, Paechter, Papousek, & Ruggeri, 2012; test anxiety, Ariani & Susilo, 2018) and graduate students (statistics anxiety; Onwuegbuzie, 2004). However, beyond academic procrastination research differentiating between specific types of anxiety, there are discrepancies as to the assumed role of anxiety as being a consequence of academic procrastination (procrastination leading students to feel more anxious about approaching

deadlines) or a correlate and/or antecedent of procrastination (procrastination as a response to anxiety over academic tasks). Overall, the current literature on academic procrastination is unclear as to whether anxiety predicts or is predicted by procrastination, if they are co-occurring, or if there is a reciprocal relationship between these variables, with further research required to more explicitly examine these mixed assumptions concerning such relations.

In addition, although theorists and researchers alike have consistently emphasized the affective component of procrastination, few studies have empirically explored the relationship between academic procrastination and other negative emotions (e.g., hopelessness, boredom) or positive emotions (e.g., hope, pride). Moreover, whereas most research on academic procrastination has been conducted with undergraduate students, few studies to date have examined the links between academic procrastination and emotions in graduate students (e.g., hope and procrastination, Alexander & Onwuegbuzie, 2007). To remedy these issues, the present dissertation provides an overview of critical theoretical underpinnings concerning the nature and components of procrastination and further reviews empirical work in which the antecedents and consequences of academic procrastination have been examined. Additionally, in the present dissertation theoretical assertions and empirical findings with respect to varied emotions in relation to academic procrastination, with a specific emphasis on achievement emotions pertaining to learning in academic contexts (cf. procrastination and learning-related anxiety; Pekrun, 2006) will be outlined. Finally, empirical results from two longitudinal studies conducted with both undergraduate and graduate students internationally will be outlined in which evidence with respect to relations between academic procrastination and affective variables is provided.

Literature Review on Procrastination

History of Procrastination

The concept of procrastination was recognized and recorded in 800 BC, when the ancient Greek poet Hesiod stated "do not put your work off till tomorrow and the day after; for a sluggish worker does not fill his barn, nor one who puts off his work: industry makes work go well, but a man who puts off work is always at hand-grips with ruin" (*Works and Days*, 1. 143). Procrastination was subsequently referred to in the ethical teachings of Rabbias in which he stated, "Do not say that when I will be free, I will study because you may never be free" (50 C.E.; *Ethics of the Fathers*, 2.4), with the Roman statesman Cicero calling procrastination "hateful" (44 B.C.; *Philippics*, 6.7), and the Bible referring to it as a sin (James, 4.17). Throughout history, procrastination has been labeled as a negative and undesirable behaviour in denoting a lack of moral character and weakness of will (referred to in Greek as "akrasia"; Pychyl, 2011). Despite being antiquated in origin, these definitions and explanations of procrastination are consistent with modern conceptualizations of procrastination that are presently understood as referring to actions that go against one's own better judgement in unnecessarily impeding goal attainment for oneself.

What is Academic Procrastination?

Despite a common societal understanding of the general concept of procrastination, there is to date no commonly shared theory of procrastination behaviour (van Eerde, 2003). According to Tuckman (1991), procrastination can be defined as the "tendency to put off or completely avoid an activity under one's control" (p. 474). However, other authors have defined procrastination as delaying an intended course of action with some researchers further noting that this decision is taken despite knowing that it will lead to undesirable outcomes (Balkis & Duru, 2007; Pychyl,

2008; Silver & Sabini, 1981). In an attempt to incorporate these varied perspectives, Steel (2007) proposed the now widely-adopted definition of procrastination as the *voluntary and needless delay of an intended action, despite inevitable unpleasant/negative consequences.* With respect to the academic domain, academic procrastination has been further defined in this tradition as the *irrational predisposition to delay the start and/or completion of an academic task* (Senécal, Julian, & Guay, 2003). Whereas procrastination in general refers to delaying intended tasks in everyday life (e.g., taxes, doctor visits), academic procrastination occurs when students procrastinate specifically on academic tasks (e.g., writing papers, preparing for exams, and weekly readings).

Dysfunctional delay. Accordingly, the first element of procrastination involves the delay of an intended course of action. However, it is important to note that "all procrastination is delay, but not all delay is procrastination" (Pychyl, 2013, p. 1). Whereas the words "delay" and "procrastination" are often used interchangeably, procrastination refers specifically to dysfunctional delays (Klingsieck, 2013). Procrastination involves setting an intention to complete a task, yet failing to act upon this plan (i.e., intention-action gap). In contrast, delay is more closely associated with time management, is negatively associated with academic procrastination (Lay & Schouwenburg, 1993), and involves prioritizing more beneficial tasks in other life domains resulting in revised intentions (Pychyl, 2009a). For example, imagine a student who plans to do their homework on Friday (i.e., setting an intention to do an academic task at a given time) but on Friday goes against their plan and instead watches television thereby needlessly putting off their academic task (i.e., failing to act on their previously set intention). Now imagine another student who also planned to do their homework on Friday, but upon request decided to drive their parent to a doctor's appointment thereby updating their initial

academic intention to prioritize more urgent personal obligations. The first student needlessly engaged in academic procrastination and went against their initial intention to study by doing something unnecessary, whereas the second student adapted their intention to accommodate a change in circumstances (i.e., updating their intention). Thus, in contrast to procrastination, delaying a task can be viewed as an adaptive and responsible way of balancing competing personal obligations.

Unfortunately, there exists considerable confusion in the current procrastination literature due to researchers having used the term "procrastination" to describe "delay," as well as vice versa. Furthermore researchers have recently proposed multiple subtypes of delay and procrastination that have further contributed to mixed findings in the procrastination literature (passive vs. active procrastination: Cao, 2012; Choi & Moran, 2009; Chu & Choi, 2005; maladaptive vs. adaptive procrastination: Corkin, Yu, & Lindt, 2011; four types of delay: Grunschel, Patrzel, & Fries, 2013a). These new terminologies mirror results found when comparing procrastination and delay. For instance, Grunschel et al. (2013a) found that among university students, there were four distinct types of "delayers": 1) the *inconspicuous type*, who lacked study and self-management skills, 2) the *successful pressure-seeking type*, who delayed based on past success and preferred working under pressure, 3) the *worried/anxious type*, who frequently experienced anxiety, and 4) the *discontent with studies type*, who were unhappy with their learning environments. The researchers classified the inconspicuous and pressure-seeking groups together as *purposeful delayers*; students who did not experience any negative consequences due to their delay and scored high on conscientiousness as well as satisfaction with their studies and life in general. Instead, the worried/anxious and discontented groups were categorized together as *academic procrastinators*; students who demonstrated key features

associated with self-regulation failure, with high levels of academic procrastination, psychological strain, as well as low satisfaction with studying and life. Therefore, whereas students who engaged in traditional procrastination needlessly put off their work, purposeful delayers rationally plan to delay their work.

According to Steel's (2007) definition, procrastination involves inaction that results in negative consequences. However, according to students' phenomenological experiences of procrastination, not all procrastination results in unpleasant outcomes, with students often reporting that they may knowingly postpone tasks to take advantage of certain positive features associated with procrastinating, such as higher levels of motivation when working under pressure (Choi & Moran, 2009; Chu & Choi, 2005; Schraw, Wadkins, & Olafson, 2007). In order to further examine the positive effects of procrastination, researchers studied two distinct types called passive vs. active procrastination. *Passive procrastination* is equivalent to traditional procrastination, where students become overwhelmed by indecision and needlessly put off important tasks (usually resulting in negative consequences), whereas *active procrastination* refers to rational delay, where students make the intentional decision to procrastinate in order to optimize their motivation.

Active procrastination is assumed to include an affective component: students prefer doing their work under pressure and enjoy feeling challenged by leaving their work until the last minute which motivates them to work harder. Active procrastination is also hypothesized to involve a cognitive component, whereby students make the intentional decision to procrastinate, are able to meet their deadlines, and obtain higher GPAs than students who engage in passive procrastination or do not procrastinate, by accurately estimating the amount of time remaining to complete their tasks (Chu & Choi, 2005; Corkin et al., 2011; Hensley, 2014; Kim & Seo, 2013).

Furthermore, students who actively delay their tasks have been shown to use more adaptive self-regulated learning strategies than typical procrastinators, such as effort regulation (Kim & Seo, 2013). In contrast, students who engage in passive procrastination are typically unable to complete assignments on time due to not allocating enough time and becoming overwhelmed once they begin working on their assignments (Tice & Baumeister, 1997).

However, it has been argued that the term "active procrastination" is synonymous with delay thereby misattributing possible positive effects of procrastination to traditional procrastination as opposed to more adaptive effort regulation strategies (Corkin et al., 2011; Pychyl, 2009b). Furthermore, a recent empirical analysis more strongly asserted that active procrastination is not in fact a true form of procrastination, but instead represents a type of deliberate, purposeful delay (Chowdhury & Pychyl, 2018). For example, the proposed underlying element of active procrastination called "preference for pressure" involves leaving work until the last minute to increase levels of motivation and enter into a state of flow (Kim & Seo, 2013). When doing this, students actively chose to postpone their tasks and are therefore not needlessly leaving their work until the last minute, the hallmark of procrastination behaviour. Contrary to needless delay, their active choice to delay their task demonstrates that they did not in fact violate their initial intention to start their work earlier. Relatedly, researchers posit that students who engage in procrastination often make excuses for their behaviours due to cognitive dissonance (intention vs. action; Festinger, 1957), providing a socially acceptable justification to remedy this conflict (i.e., I work best under pressure), thereby calling into question the validity of the active procrastination construct (Simpson & Pychyl, 2009). To conclude, the first commonly assumed component of procrastination is that this type of delay involves an intention-action gap where students plan to do academic tasks but do not act on these plans.

Irrational delay. The second element of procrastination is the irrationality accompanying the delay. According to Silver and Sabini (1981), procrastination is considered irrational due to the individual being clearly aware of what they ought to be doing, yet not doing it. In other words, irrational behaviours involve not only engaging in dysfunctional delay resulting in negative consequences, it further involves choosing to engage in dysfunctional delays despite the awareness that these actions will not be advantageous (Steel, 2007). Students who procrastinate tend to have irrational beliefs regarding their inadequacies and capabilities to accomplish their goals/tasks (Steel, 2007). The specific irrational or delusional beliefs that students hold are further assumed to impact their tendencies to engage in academic procrastination. One specific type of irrational belief associated with academic procrastination pertains to irrational concerns with respect to taking risks, making decisions, and becoming dependent on others (Bridges & Roig, 1997). Whereas students who report rational beliefs about studying (e.g., preparing assignments in advance in case of unexpected delays, Egan, Canale, Del Rosario, & White, 2007) are less likely to procrastinate and perform better (Balkis, 2013), students with higher levels of irrational and delusional beliefs tend to engage in academic procrastination more frequently. For example, research by Sigall, Kruglankski, and Fyock (2010) found in an experimental study that students with high scores on a measure of wishful thinking procrastinated more on unpleasant tasks than pleasant tasks as compared to students with lower levels of wishful thinking. Taken together, procrastination is thus commonly defined as a type of dysfunctional and irrational delay that involves an intention-action gap whereby students do not act on their intentions despite knowing the negative ramifications of such inaction.

Theoretical Models of Procrastination

Although procrastination has long been documented in historical records, theoretical perspectives and empirical research dedicated specifically to procrastination have only emerged in the last 30 years (Milgram & Tenne, 2000). Unfortunately, although there exists a wealth of research on academic procrastination, most studies do not share a common theoretical approach to understanding procrastination (van Eerde, 2003). In an effort to develop a preliminary paradigm within which procrastination could be more systematically examined, Schraw and colleagues (2007) used a grounded theory approach following from interviews with undergraduate students, resulting in a model of academic procrastination in which five components in the following sequence were proposed: antecedents of procrastination → experience of procrastination → coping strategies → consequences of procrastination. Their model also attempted to account for how different contexts and situations might impact both the experience of procrastination, as well as the coping strategies used by students, but proposing these as critical moderators of relations at different points in the procrastination sequence.

In support of this model, Schraw et al. (2007) found that students attributed their academic procrastination to three different types of antecedents: personal interest, features associated with their instructors (e.g., flexible grading), and task characteristics (e.g., task difficulty). As for the experience of procrastination, it was typically explained as a maladaptive behaviour following from fear of failure and laziness yet also acknowledged as potentially adaptive for learning due to heightened cognitive efficiency (maximizing learning in the least amount of time). Students also discussed using cognitive and affective coping strategies to manage their procrastination, including planning, cognitive reframing, and physical activity, and also reported how different contexts and conditions (e.g., unclear directions, lack of incentives) impacted their

procrastination levels. Findings also underscored the negative consequences of academic

procrastination with respect to quality of life and work (i.e., isolation due to studying, resulting

in feelings of anxiety and guilt). This paradigm model supports the majority of the research

conducted on academic procrastination to date (see meta-analytic research by Steel, 2007).

Furthermore, this model is novel in both its methodological approach to understanding this

behavioural predisposition by using interviews as qualitative assessments of academic

procrastination, and in its attempt to understand the differing components of academic

procrastination. More recently, in their systematic review of the existing published literature,

Klingsieck, Grund, Schmid, and Fries (2013) further identified the critical antecedents of

academic procrastination as involving various personal factors such as motivation (e.g., lack of

intrinsic motivation), volition (e.g., low self-discipline), emotions (e.g., heightened anxiety),

competencies (e.g., biased time estimations), and traits (e.g., issues with decision making). These

authors additionally identified various situational antecedents of academic procrastination

behaviours that have been examined in prior research, such as social influences (e.g., others'

attitudes towards procrastination), external structure (e.g., course load), and task-related factors

(e.g., task aversiveness).

In contrast, a different approach was recently outlined by Klingsieck (2013) who proposed

a systematic classification of the trends in procrastination research in which existing theoretical

and empirical papers on procrastination were categorized into four perspectives. First, *the*

differential perspective examines procrastination as a personality trait and how it relates to other

variables, such as the big-five personality traits (Costa & McCrae, 1992). Second, *the clinical*

psychology perspective assesses how procrastination is related to more clinically significant

variables, such as depression and anxiety. Third, *the motivational and volitional psychology*

perspective examines procrastination as a failure in motivation and investigates the relationships specifically between procrastination and motivational variables. Lastly, the *situational perspective* explores the context of the procrastination itself with respect to how specific elements of a given task can elicit greater procrastination behaviour. Other perspectives of procrastination that the author was unable to fit into the aforementioned categories included arousal and avoidance procrastination (e.g., false beliefs that one works best under pressure vs. avoiding a task out of a fear of failure), biological theories (e.g., the relationship between procrastination and attention deficit disorders or the biological clocks, such as morning types and evening types), and developmental characteristics of procrastination (e.g., child development as a function of parenting styles).

Implementation intentions. Beyond these recent efforts to systematically conceptualize procrastination behaviours, the longstanding concept of implementation intentions has also been used to understand procrastination. According to Gollwitzer (1999), goal intention refers to a specific desired end point as reflected in the phrase "I intend to reach X" (p. 494). However, goal achievement may be unsuccessful despite strong intentions, due to problems beginning a task, getting disorganized, or overextending oneself due to competing goals (Gollwitzer, 1999; Gollwitzer & Sheeran, 2006). To bridge the gap between goal intentions and successful goal achievement, researchers proposed that *implementation intentions* need to be reinforced through "if-then plans that connect good opportunities to act with cognitive or behavioural responses that are effective in accomplishing one's goals" (Gollwitzer & Sheeran, 2006, p. 82). When students are faced with problems in converting their goals into actions, they can associate expected situations with goal-directed behaviours in order to have this serve as a situational signal, prompting a preferred behavioural reaction instinctively. In other words, students may be able to

carry out their intentions if they create plans that include both finding a time in which they can do a given task and creating a plan to do it at that time.

Based on the Theory of Reasoned Action (Fishbein & Ajzen, 1980) and the Theory of Planned Behaviour (Ajzen, 1985), this concept of implementation intentions as introduced by Gollwitzer (1993, 1999) aimed to understand how specific actions may conflict with goal-directed intentions. As such, implementation intentions do not simply reflect goal intentions that specify only *what* the desired outcome is, they further outline *when*, *where,* and *how* that goal can best be achieved. Implementation intentions can thus be understood as "when situation X arises, I will perform response Y" (Gollwitzer, 1999, p. 494). For example, if a student's goal is to be more studious, they can achieve this goal by first deciding to study on Friday night instead of going to a party (change in behaviour), and second, by creating a mental representation of a good opportunity to implement their intention (e.g., when their friends call to invite them out). Accordingly, their implementation intention would be: "When my friends call to invite me to go to a party on Friday night, I will say no and study instead." Research has consistently shown implementation intentions to facilitate personal goal attainment in university students (e.g., Brandstätter, Lengfelder, & Gollwitzer, 2001; Gollwitzer & Brandstätter, 1997; Milne, Orbell, & Sheeran, 2002; Orbell, Hodgkins, & Sheeran, 1997; Sheeran & Orbell, 1999) with a meta-analysis of 94 studies showing implementation intentions to significantly increase the probability of accomplishing personal goals (Gollwitzer & Sheeran, 2006).

With respect to academic procrastination, this theoretical approach would conceptualize this behaviour as students having opportunities to apply implementation intentions but failing to acknowledge or utilize them. As a result, procrastination is often operationalized according to this perspective as failing to get started on one's work and getting easily derailed or distracted

from one's goals. However, although limited research examining procrastination from an implementation intentions perspective has shown students who score high on procrastination to not be disadvantaged with respect to attaining their learning goals (e.g., Pychyl, Morin, & Salmon, 2000), other research has found a significant negative relationship between implementation intentions and self-reported procrastination in undergraduates (e.g., Howell, Watson, Powell, & Buro, 2006; see also Owens, Bowman, & Dill, 2008 for positive relations between implementation intentions and keeping appointments). As such, whereas the implementation intentions perspective propose that students' avoidance, refusal, or inability to recognize opportune moments to implement intentions should constitute an important aspect of procrastination behaviour, more research linking these related concepts is needed.

Self-regulation failure. Self-regulation as a construct is typically described as a complex process with many opportunities for transgressions, making it difficult to adequately explain how and when self-regulation failure occurs (Baumeister & Heatherton, 1996). As one attempts to account for why this occurs, procrastination has also been conceptualized as "quintessential self-regulation failure" (Steel, 2007, p. 65, see also Baumeister & Heatherton, 1996; Howell & Watson, 2007; Pychyl, 2013; Tuckman, 1991). Some researchers have proposed that procrastination represents a form of *underregulation*, indicative of poor self-regulation (Ferrari, 2001; Howell & Watson, 2007; Senécal, Koestner, & Vallerand, 1995), by failing to employ the necessary self-control to do or complete a task (Sirois & Pychyl, 2013). This assertion is supported by research showing students with poor self-regulatory skills relating to cognitive, motivational, and behavioural regulation to also have high levels of academic procrastination (Park & Sperling, 2012). Students who frequently procrastinate are thus assumed to be less able to effectively use cognitive and motivational strategies as compared to students who less

frequently procrastinate who are better able to plan, monitor, and evaluate their work (Park &
Sperling, 2012). This assumption is also supported by research showing student procrastination
to relate to poorer levels of motivation, planning, organization, and execution (Howell &
Watson, 2007; Rabin, Fogel, & Nutter-Upham, 2001).

In contrast, other researchers have described self-regulation failure as a form of
misregulation whereby students focus on regulating negative emotions caused by their tasks as
opposed to regulating behaviours that are necessary for goal attainment (Balkis & Duru, 2016;
Baumeister & Heatherton, 1996; Sirois & Pychyl, 2013). Accordingly, this type of self-
regulation failure is assumed to result from an inner conflict between competing desires
(Baumeister & Heatherton, 1996) and prioritizing emotional regulation and/or mood repair over
goal accomplishment (Pychyl & Sirois, 2016; Sirois & Pychyl, 2013). For example, when a task
elicits negative emotions within a student (i.e., anxiety), they are assumed to avoid the task in
order to remedy their affective state (e.g., reduce the anxiety), instead of regulating themselves
towards their goal of completing an assignment or task. The act of delaying an intended action
not only shifts the burdens of today to tomorrow, it also shifts the associated stress from today to
tomorrow while increasing it in the process (as demonstrated by Tice & Baumeister, 1997).
Further to the role of emotion regulation in procrastination, findings show students who forgive
themselves for procrastination to report lower procrastination tendencies (Martinčeková &
Enright, 2018) such that students who are able to forgive themselves for their procrastination are
less likely to engage in it in the future (Wohl, Pychyl, & Bennett, 2010; for finding on how self-
compassion mediates effects of stress on procrastination, see Sirois, 2014a).

In contrast to effective self-regulation in which students plan, monitor, and adjust their
behaviours as necessary, procrastination is assumed in self-regulation frameworks to reflect an

inability to regulate one's behaviours appropriately, with respect to starting a task, keeping on track, and completing their task. Overall, whether underregulation or misregulation is responsible for students' self-regulation failure, both cases implicate students' failure to optimally regulate their cognitions, emotions, or behaviours, resulting in academic procrastination. Both of these viewpoints also align with Klingsieck (2013) who found the motivational and volitional psychology perspective (with a focus on motivation; underregulation hypothesis) and the clinical psychology perspective (with a focus on emotions; misregulation hypothesis) to be two of the theoretical approaches most commonly researched when trying to understand procrastination.

Consequences of Academic Procrastination

Procrastination is generally understood as a maladaptive, harmful behaviour that has negative consequences for students' affective states (qualitative interviews: Schraw et al., 2007; Patrzek et al., 2012; longitudinal research: Krause & Freund, 2014; Tice & Baumeister, 1997), with longitudinal findings further highlighting deleterious effects of procrastination over time on academic performance (Moon & Illingworth, 2005), and health (Tice & Baumeister, 1997). Unfortunately, it should be noted that some research in which the consequences of procrastination were inferred have been cross-sectional in nature, with causal inferences based on correlations, thereby failing to provide causal evidence for the effects of procrastination. For example, whereas a correlation between academic procrastination and anxiety may suggest students are engaging in academic procrastination because they experience anxiety, it may also suggest that the experience of anxiety leads to academic procrastination. Acknowledging this important caveat, the following section describes findings from existing longitudinal and cross-sectional studies in which negative and positive consequences of academic procrastination, either

as demonstrated using longitudinal models or explicitly assumed by the researchers involved, have been studied specifically in higher education student populations.

Affective states. In a qualitative analysis of academic procrastination, researchers found that the consequences associated with procrastination in undergraduate students can be divided into two themes: perceived quality of life and quality of work (Schraw et al., 2007). First, procrastination led to unfavorable quality of life perceptions with respect to feelings of guilt, stress, fatigue, and anxiety, as well as mild levels of depression resulting from being consistently isolated due to studying. More specifically, stress and fatigue were damaging for students' personal lives, and failing to complete their work at the most optimal time led to feelings of guilt. In addition to these affective states, qualitative interviews with university counselors regarding student procrastination revealed that students frequently felt dissatisfied, pressured, uneasy, and remorseful after engaging in procrastination (Patrzek et al., 2012). These results are consistent with other cross-sectional quantitative findings showing procrastination to relate positively to various negative emotional states in undergraduate students such as anxiety (Solomon & Rothblum, 1984), as well as shame and guilt (Fee & Tangney, 2000). Longitudinal findings from Tice and Baumeister (1997) further showed students who procrastinated to experience higher levels of relief after turning in their papers, as compared to students who less frequently procrastinated on academic tasks. Similarly, Krause and Freund (2014) found academic procrastination to negatively predict affective well-being (measured using state questionnaire items such as "How good do you feel at this moment?") measured 16 times over eight weeks. Taken together, these findings show students' emotions to correspond significantly with academic procrastination, with these negative emotions having been suggested by these researchers as following from procrastination behaviours, as opposed to vice versa.

Academic achievement and attainment. Findings concerning the effects of academic procrastination on subsequent achievement outcomes to date are mixed. When investigating the consequences of academic procrastination, qualitative analyses revealed that students did not believe their procrastination behaviours to impact their quality of work (i.e., academic performance; Schraw et al., 2007). Upon further inquiry, students tended to offer three types of reasons for why procrastination did not affect their academic achievement: 1) More time was spent on a task at one time making it easier to understand all of the material; 2) procrastinating allowed for more time to think about the task prior to starting; and 3) students experienced increased motivation closer to the deadline, reporting that they needed high levels of stress and pressure to perform optimally (i.e., to enter into a state of flow). Also, in a cross-sectional assessment of undergraduate students' study habits, students who procrastinated on academic tasks were found to study less than students who less frequently procrastinated, with no significant differences found with respect to their exam performance (Pychyl, Morin, et al., 2000).

However, other longitudinal quantitative studies found behavioural procrastination to be negatively related to test performance throughout the semester in undergraduate students (Moon & Illingworth, 2005). More specifically, academic procrastination was found to negatively correlate with academic performance on varying academic tasks in undergraduate students both early in the semester and later in the term closer to deadlines (i.e., term paper and exam; Tice & Baumeister, 1997) due to students having less time for researching and editing. Other cross-sectional studies similarly show greater academic procrastination to correspond consistently with lower grades (Beswick et al., 1988; Klassen et al., 2010; for meta-analytic findings, see Kim, & Seo, 2015), be negatively related to earned credits in first-year university students (Kamphorst,

Hofman, Jansen, & Terlouw, 2013), and be positively related to college dropout (Patrzel et al., 2012). Findings have also shown procrastination to account for a significant proportion of the variance in college grades, over and above the predictive effects of ability and prior grades (i.e., Wesley, 1994).

Whereas these results show inconsistencies with respect to whether or not academic procrastination causes detriments in academic performance, these discrepancies may be explained by differentiating between academic procrastination and delay. For example, students who report that they rely on procrastination in order to experience increases in motivation and efficiency as deadlines approach may procrastinate intentionally and thus be engaging in adaptive delay (i.e., effective time management, effort regulation), with this type of behaviour having less of a negative impact on academic outcomes. As previously mentioned, these behaviours would not be considered indicative of academic procrastination, with studies in which students obtain lower academic achievement after reporting high levels of academic procrastination better reflecting traditional academic procrastination. However, given that the scales used by most authors to assess academic procrastination are not measuring active procrastination or rational delay, but instead measure maladaptive traditional procrastination, the state of the current literature on this topic is best characterized overall as demonstrating a negative relationship between academic procrastination and academic achievement.

Physical health and stress. Procrastination has also been found to have adverse effects on physical health outcomes (Sirois & Pychyl, 2013). One qualitative study found students to report higher levels of mental illness as a result of procrastination (e.g., depression; Patrzel et al., 2012), with another longitudinal study by Tice and Baumeister (1997) showing procrastination to correlate negatively with symptoms of physical illness. Furthermore, Tice and Baumeister (1997)

found that the benefits of procrastination, with regards to stress and health were only seen early in the semester. As the semester came to an end, procrastination led to more stress, illness symptoms, and more visits to health care professionals. Furthermore, not only did procrastination shift stress levels from early in the semester to closer to the deadline, it additionally intensified the amount of stress experienced once the deadline was in sight. Relatedly, procrastination is positively linked to stress in other cross-sectional studies with undergraduate students as well (Ferrari, 2001, Ströber & Joormann, 2001; Sirois & Tosti, 2012, Sirois, Melia-Gordon, & Pychyl, 2003, for a review, see Sirois & Pychyl, 2016).

Summary. In sum, findings show procrastination to have adverse effects on not only academic outcomes, but also students' affective states, stress, and physical health. Consistent with assertions by Tice and Baumeister (1997), any positive outcomes resulting from postponing one's academic tasks are consistently found to be outweighed by the psychological and physical costs associated with procrastination (i.e., higher stress, poorer achievement). Nevertheless, it remains an underexplored possibility that procrastination may in some cases benefit academic and personal outcomes for students (e.g., active procrastination findings; Cao, 2012). Given the predominantly cross-sectional nature of the studies reported, more longitudinal and experimental studies are needed to better understand the relationships between academic procrastination, academic outcomes, and personal well-being.

Antecedents and Correlates of Academic Procrastination

With respect to the potential causes of academic procrastination, students typically report multiple reasons for this behaviour including both personal and contextual factors. Recently, a literature review by Sims (2014) proposed four broad factors which lead to academic procrastination including low task enjoyment ("do I like doing it?"), expected negative outcomes

("what will be the result?"), perceived inability to perform the task ("am I able to do it?"), and distractions caused by other more attractive tasks ("is there something better to do?"). Relatedly, qualitative interview findings with students (Grunschel, Patrzek, & Fries, 2013b) and counselors (Patrzek et al., 2012), showed that internal antecedents of academic procrastination included personality factors (e.g., personality traits or negative self-concept), low perceived competence (e.g., lack of knowledge, self-regulation capabilities), negative affect (e.g., anxiety), maladaptive cognition (e.g., worries), negative prior learning experiences (e.g., learning history), mental/physical states (e.g., impairment), perceived task characteristics (e.g., low importance), and personal beliefs (e.g., "I work best under pressure").

External antecedents of procrastination have also been identified in recent qualitative research on student procrastination (Klingsieck et al., 2013; Solomon & Rothblum, 1984; Steel, 2007) including obligations or resources in one's private lives (e.g., lack of social networks), and university-related factors (e.g., specific working conditions, lecturers' characteristics, and institutional conditions) precede procrastination. Taken together, these findings are consistent with other quantitative studies investigating each of these categories individually, showing internal antecedents such as personality characteristics (Flett et al., 1992), motivational factors (Klassen et al., 2008), demographic factors (Deemer, Smith, Carroll, & Carpenter, 2014) and affective variables (Ferrari, 1991), as well as external antecedents (Schraw et al., 2007; Steel, 2007) to be related to academic procrastination. The following sections outline findings on how academic procrastination corresponds empirically with both internal factors (e.g., demographic, psychological) as well as external factors (social-environmental context).

Internal Antecedents and Correlates

Personality characteristics. Concerning the role of stable, internal psychological factors in procrastination behaviour, McCown, Johnson, and Petzel (1989) found three distinct personality profiles to be related to procrastination: 1) psychotic, impulsive, tough-minded individuals, who have trouble with deadlines because of social stressors, 2) extraverted, neurotic, and overconfident individuals, and 3) highly neurotic, somewhat extraverted individuals, who frequently experience negative affect (particularly depression), lack confidence, and are unable to complete tasks on time. More recently, researchers have begun to investigate academic procrastination in relation to more specific personality traits (e.g., "Big Five" model, Costa & McCrae, 1992), finding academic procrastination to negatively relate to conscientiousness (van Eerde, 2003), and agreeableness, (Pierro, Giacomantonio, Pica, Kruglanski, & Higgins, 2011), positively relate to neuroticism (Hess et al., 2000) and openness to experience (Schouwenberg & Lay, 1995), and show mixed relationships with extraversion (e.g., positive relations: Freeman, Cox-Fuenzalida, & Stoltenberg, 2001; negative relations: Johnson & Bloom, 1995; Pierro et al., 2011). Furthermore, procrastination has also been found to be positively related to the "Dark Triad" of personality traits (narcissism, Machiavellianism, and psychopathy) including the entitlement/exploitativeness facet of narcissism (Lyons & Rice, 2014) and perfectionism (Flett et al., 1992).

With respect to the personality trait of conscientiousness, that includes components related to order, dutifulness, competence, achievement striving, deliberation, and self-discipline (Costa & McCrae, 1992), research has shown negative relationships between this personality trait and academic procrastination (Lay, 1997; Lee, Kelly, & Edwards, 2006; Pierro et al., 2011; Rabin et al., 2011; Schouwenberg & Lay, 1995; van Eerde, 2003). The conscientiousness subcomponent

entitled "lack of self-discipline" has consistently been found to be the largest positive predictor of procrastination, followed by dutifulness, orderliness, and decreased achievement striving (Johnson & Bloom, 1995; Watson, 2001). Concerning neuroticism, a trait proposed to reflect vulnerability, hostility, anxiety, depression, impulsiveness, and self-consciousness (Costa & McCrae, 1992), research has typically shown neurotic students to have higher academic procrastination (Hess et al., 2000; Johnson & Bloom, 1995; Pierro et al., 2011; Lee et al. 2006; Schouwenberg & Lay, 1995; Watson, 2001; van Eerde, 2003). The neuroticism subcomponent of "impulsiveness" has specifically been found to positively predict procrastination, consistent with other findings that have shown procrastination to relate to impulsivity (Gustavson, Miyake, Hewitt, & Friedman, 2014).

The personality trait of extraversion has also been found to show weak positive relationships with procrastination, with this trait operationalized as including warmth, activity, assertiveness, and excitement seeking (Costa & McCrae, 1992). In other words, students are more likely to engage in procrastination if they are extraverted, because they get easily distracted and have many preplanned social obligations that interfere with studying (Freeman et al., 2011; McCown & Johnson, 1991). However, research has also found procrastination to be negatively related to extraversion (Johnson & Bloom, 1995; Pierro et al., 2011), specifically the subfacets of activity, warmth, and assertiveness (Schouwenberg & Lay, 1995; Watson, 2001). Openness to experience, involving components related to fantasy, ideas, actions, and values, has additionally shown positively correlations with academic procrastination (Costa & McCrae, 1992), particularly the "fantasy" subcomponent, suggesting that a lively imagination may distract students from their intended goals (Schouwenberg & Lay, 1995). Finally, agreeableness, defined as involving trust, compliance, and altruism, has been demonstrated to correlate negatively with

academic procrastination, indicating that students who more frequently procrastinate may be more selfish than their peers (Johnson & Bloom, 1995; Pierro et al., 2011; Schouwenburg & Lay, 1995).

Perfectionism has consistently been investigated alongside procrastination, with the majority of research showing perfectionism to be positively related to academic procrastination (e.g., Burnam, Komarraju, Hamel, & Nadler, 2014; negative perfectionism, Burns, Dittmann, Nguyen, & Mitchelson, 2000; socially-prescribed perfectionism, Flett et al., 1992). Perfectionism is defined as the pursuit of high personal standards (Slaney, Rice, & Ashby, 2002) and accordingly is similar to academic procrastination in that both concepts relate to worrying, anxiety, and depression (Stöber & Joormann, 2001). However, recent research has further differentiated the conceptualization of perfectionism into two subtypes: *self-oriented perfectionism,* where people impose high standards on themselves, and *socially-prescribed perfectionism,* where individuals follow the standards imposed by others, such as family or significant others (Stoeber, Feast, & Hayward, 2009). Research to date shows self-oriented perfectionism to have mixed results with studies showing it to be related to both lower academic procrastination in both undergraduate and graduate students (undergraduates, Saddler, & Buley, 1999; undergraduate/graduate students, Saddler, & Sacks, 1993), as well as higher academic procrastination (undergraduates; Çapan, 2010). In contrast, socially prescribed perfectionism has been found to positively relate to test anxiety and academic procrastination (undergraduates, Saddler, & Buley, 1999; undergraduate/graduate students, Saddler, & Sacks, 1993). Moreover, research in which procrastination is more specifically operationalized as caused by a fear of failure has also shown both self-oriented and socially-prescribed perfectionism to correspond with higher academic procrastination levels (Onwuegbuzie, 2000).

As mentioned previously, different approaches have been proposed to conceptualize how academic procrastination represents self-regulation failure, with these approaches typically falling into one of two categories: underregulation or misregulation. Given findings showing personality characteristics involving lack of discipline (e.g., low levels of conscientiousness, Johnson & Bloom, 1995; Watson, 2001; fantasy component of openness to experience, Schouwenberg & Lay, 1995; low levels of agreeableness, Pierro et al., 2011, and high impulsivity, Gustavson et al., 2014) to correlate positively with academic procrastination, this directly suggests that poor behavioural self-regulation (i.e., self-control) may be contributing to procrastination behaviour (underregulation hypothesis of academic procrastination).

Similarly, findings showing personality factors reflecting the maladaptive internal management of negative emotional experiences including neuroticism (includes components of anxiety and depression; Hess et al., 2000; Johnson & Bloom, 1995; Pierro et al., 2011; Schouwenberg & Lay, 1995; Steel, 2007; Watson, 2001) or perfectionism (involves worry, fear, anxiety, and depression; Onwuegbuzie, 2000; Saddler, & Buley, 1999; Saddler, & Sacks, 1993; Stöber, & Joormann, 2001) to contribute to greater academic procrastination also underscores the potential role of self-regulation of emotions in procrastination behaviour (misregulation hypothesis of academic procrastination).

Motivational beliefs. In line with the underregulation hypothesis, Sénecal and colleagues (1995) proposed that academic procrastination is a motivational problem with empirical findings also showing procrastination to correlate negatively with overall self-reported motivation levels (Pychyl, Lee, et al., 2000). In a contemporary review of the literature on motivation, Murphy and Alexander (2000) identified key motivational constructs used in the study of achievement motivation including goals (e.g., mastery and/or performance goals), motivation orientation (e.g.,

intrinsic and/or extrinsic motivation), interest (e.g., value), and personal beliefs (e.g., self-efficacy and/or attributions). How each of these types of motivational variables relates to academic procrastination is examined in the sections below.

The achievement goal framework postulates that students' motivation and behaviours related to their achievement can be best understood with respect to their academic goals (Ames, 1992). The 2 X 2 achievement goal framework differentiates between four goal orientations: mastery-approach (striving to learn and improve competencies), mastery-avoidance (striving to know everything there is to learn), performance-approach (striving to perform better than others), and performance-avoidance (avoiding performing poorly compared to others; Elliot & Mcgregor, 2001; Howell & Watson, 2007; Pintrich, 2000). Research has shown overall mastery-orientation, and mastery-approach goals specifically, to correlate negatively with procrastination (e.g., undergraduates: Howell & Buro, 2009; Howell & Watson, 2007; Seo, 2009; graduate students: Cao, 2012), with mastery-avoidance goals instead found to be positively associated with procrastination (Howell & Buro, 2009; Howell & Watson, 2007; Seo, 2009). Whereas some researchers have additionally found a negative relationship between performance-approach goals and procrastination (Howell & Buro, 2009), other studies show a positive relationship (Seo, 2009) or no correlation (Howell & Watson, 2007). Similarly, investigators have also found a positive correlation between performance-avoidance goals and academic procrastination (Elliot & Mcgregor, 2001; Seo, 2009).

According to the proponents of Self-Determination Theory, there are two distinct types of motivational orientations: intrinsic motivation, which refers to doing a task for the inherent gratification of the task itself, and extrinsic motivation, which refers to doing a task for an external reason (e.g., high grades; Deci & Ryan, 1985; Ryan & Deci, 2000). Overall,

procrastination is negatively correlated with self-determined motivation (high intrinsic, low extrinsic; Burnam et al., 2014; Lee, 2005) and intrinsic motivation specifically (e.g., Cerino, 2014). In contrast, lower motivation overall (i.e., amotivation) and less autonomous forms of motivation (i.e., controlled by external influences) have been found to correspond with significantly greater academic procrastination (Senécal et al., 1995). With respect to the constructs related to intrinsic motivation, students' perceptions of "flow" were found to negatively correlate with academic procrastination (Lee, 2005), with students who report higher levels of interest in their academic tasks also reporting lower procrastination levels (Ackerman & Gross, 2005).

Students' perceptions of their personal intelligence have also been examined in relation to procrastination, following from the assumption that students who procrastinate base their self-worth largely on their perceived abilities and thus strive to delay evaluation information to prevent judgments of their ability (Ferrari, 1991). According to implicit theories of intelligence, beliefs that individuals hold regarding their abilities being fixed (entity theory of ability) or changeable (incremental theory of ability; Dweck & Master, 2009) are critical predictors of learning and achievement. With respect to persistence, findings show holding an entity belief of intelligence to contribute to students being more likely to quit when faced with challenges (e.g., changing their undergraduate majors; Zuckerman, Gagne, & Nafshi, 2006), with incremental beliefs instead corresponding with greater motivation, diligence, and concentration (Ommundsen, Haugen, & Thorleif, 2005). With this in mind, it is not surprising that research has shown entity beliefs to correlate with greater procrastination, with incremental beliefs conversely correlating with lower procrastination levels (Howell & Buro, 2009).

Another construct representing students' perceptions of competence that has been consistently assessed together with procrastination is self-efficacy, which refers to an individual's perception of their capabilities to perform or complete a given task (Bandura, 1986). Overall, research has found self-efficacy to be negatively correlated with procrastination in undergraduate students (Cerino, 2014; Haycock, McCarthy, & Skay, 1998; Hensley, 2014; Klassen et al., 2008; Tuckman, 1991). Relatedly, graduate students who fear failure due to perceptions of insufficient ability have also been found to be more likely to engage in academic procrastination, such as on tasks that require reading when students doubt their reading abilities (Collins, Onwuegbuzie, & Jiao, 2008). Academic procrastination has also been found to be more likely to occur when students report lower levels of specific academic competencies including English language ability (female undergraduates; Lowinger, He, Lin, & Chang, 2014), and writing ability (graduate students; Onwuegbuzie & Collins, 2001).

Students' perceptions of personal control over their academic outcomes have also been examined in relation to procrastination, as represented by constructs such as locus of control/causality. *Locus of control* refers to the degree to which individuals believe a situation to be under their personal control (internal locus of control), or controlled by external forces such as luck or other individuals (external locus of control; Rotter, 1966; Weiner, 1985). Students with an internal locus of control have lower levels of procrastination, start their tasks earlier, hand in their assignments more promptly, and take fewer days to complete their tasks as compared to students with an external locus of control (Carden, Bryant, & Moss, 2004; Janssen & Carton, 1999; Saddler & Buley, 1999). Ariely and Wertenbroch (2002) further found that when post-secondary students were given the opportunity to control their own deadlines for paper submissions, they tended to use this occasion to set earlier deadlines for themselves in order to

overcome their procrastination habits, even if those deadlines were costly (e.g., grade penalties in place for being late). In contrast, another study showed that when students were provided with opportunities to exert more control (i.e., given the option to choose which classes to take), they engaged in more procrastination due to their resources being depleted from deciding which option to choose (Vohs, Baumeister, Schmeichel, Twenge, Nelson, & Tice, 2014).

Procrastination beliefs. Students' perceptions as to the nature of procrastination itself have also been found to impact academic procrastination levels (Cao, 2012). In a study comparing beliefs about procrastination between undergraduate and graduate students, researchers found that students' beliefs about the sensibleness of procrastination were connected to their postponement behaviours (Cao, 2012). Positive metacognitive beliefs regarding the usefulness of procrastination (e.g., "Procrastination allows creativity to occur more naturally") were related to higher levels of academic procrastination, suggesting that students engaged in academic procrastination most habitually when they believed that there were some positive attributes associated with this behaviour (Cao, 2012). Also, according to Giguère, Sirois, and Vaswani (2016), students who delay academic tasks in order to do easier tasks are perceived as norm transgressors (i.e., transgressing social norms), and experience shame due to concerns over negative evaluations by others. With respect to students' perceptions regarding the procrastination of others, Ferrari and Patel (2004) found that although students who procrastinated rated another student who also procrastinated as similar to themselves and responsible for their actions, they nevertheless disliked the student. In contrast, another study showed that when judging procrastination behaviours, students rated procrastination that resulted in failure as deserving of moral responsibility when engaged in by others, but not for themselves (Rahimi, Hall, & Pychyl, 2016). Taken together, these results show that even though students are

willing to admit their participation in procrastination, they are not necessarily willing to take responsibility for their own behaviours and may rationalize this behaviour as acceptable for themselves due to its potential utility.

Self-regulation processes. With respect to self-regulation of cognition involving modification of cognitions, emotions, and behaviour in response to situational contingencies (e.g., self-regulated learning), Krause and Freund (2016) found that when undergraduate students focus their cognitive attention on how they plan to accomplish a task (process focus), instead of focusing on why they want to accomplish the task (outcome focus), they were less likely to engage in academic procrastination, especially closer to the exam date. In addition, undergraduates who evaluated their options prior to acting (defined as "assessment tendency") were found to be more likely to engage in procrastination than students who did not hesitate to begin their academic tasks (defined as "locomotion tendency"; Pierro et al., 2011).

Moreover, research on students' cognitive self-regulation with respect to perceptions of time and time management has typically portrayed students who engage in procrastination as unable to manage their time accurately, or as biased in their time estimations (Pychyl, Morin, et al., 2000; Sirois & Pychyl, 2013). One specific bias in planning is known as the planning fallacy, where students optimistically estimate the time required to complete their tasks (Buehler, Griffin, & Peetz, 2010). However, Pychyl, Morin et al. (2000) found that undergraduate students who scored high on procrastination were just as likely to accurately predict the amount of time it would take for exam preparation and studying, as compared to students who scored low on procrastination. Findings also suggest that students who reflect more intensively on how their behaviours impact their future self, report lower procrastination (Blouin-Hudon & Pychyl, 2015), whereas students who are more focused on the present report greater procrastination due to a

lack of attention being paid to the potential long-term benefits of starting and completing tasks more promptly (Lasane & Jones, 2000, for a review, please see Sirois, 2014b). Relatedly, low levels of academic rational beliefs, defined as logical beliefs supported by data, have also been found to be associated with higher academic procrastination and miscalculations in time required to prepare for exams, with high levels of academic rational beliefs conversely found to be associated with low procrastination and realistic time estimations (Balkis, Duru, & Bulus, 2013).

Affect and emotions. In line with the misregulation hypothesis, several emotions have been found to correlate with and/or be considered as antecedents of academic procrastination. Researchers have examined the relationship between academic procrastination and various emotions such as hope (Alexander & Onwuegbuzie, 2007; Zhou & Kam, 2016), anxiety (Beswick et al., 1988; Ferrari, 1991; Pychyl, Lee, et al., 2000; Saddler & Buley, 1999), shame (Fee & Tangney, 2000), guilt (Pychyl, Lee, et al., 2000), boredom (Blunt & Pychyl, 1998), and related variables such as emotional upset (Milgram, Batori, & Mowrer, 1993), positive affect (Martinčeková & Enright, 2018), achievement emotions (Howell & Buro, 2011), and a fear of failure (Haghbin, McCaffrey, & Pychyl, 2012). These findings are outlined below with respect to results for both discrete positive and negative emotional experiences reported by students and how they correspond with academic procrastination behaviours.

With respect to positive emotions, although academic procrastination is often hypothesized to correspond with feelings of enjoyment (e.g., in research with graduate students, Rakes & Dunn, 2010; for more on the theoretical rationale, see Sims, 2014), few studies have found an association between academic procrastination and enjoyment levels (i.e., non-significant correlation in Reinecke, Hartmann, & Eden, 2014; cf. negative correlation between trait procrastination and goal enjoyment in Sirois & Giguère, 2018). However, existing studies have

nevertheless consistently found procrastination to negatively correspond with the directly related constructs of intrinsic motivation (e.g., Cerino, 2014) as well as positively correspond with an inversely valenced measure of task aversiveness in undergraduate students (unpleasantness; Lay, 1990; Solomon & Rothblum, 1984). Concerning feelings of hope, findings show students with high levels of hope to be less likely to procrastinate than students with lower levels (e.g., undergraduates; Zhou & Kam, 2016), specifically with respect to postponing writing papers, studying for exams, and reading weekly assignments (e.g., graduate students; Alexander & Onwuegbuzie, 2007). Despite the potential role of overconfidence and ego in procrastination behaviours, it is important to note that no studies to date have examined the role of pride in academic procrastination.

Most of the research on emotions pertaining to academic procrastination has focused on negative emotions, namely feelings of anxiety. Overall, research has shown higher levels of procrastination to positively relate to negative affect (Balkis & Duru, 2016) and to be especially negatively correlated with anxiety in undergraduate populations (e.g., trait anxiety: Glick et al., 2014; Solomon & Rothblum 1984; general anxiety: Constantin et al., 2018). Students who experience negative emotions, such as anxiety, have also been found to be more likely to procrastinate on specific academic tasks including writing papers (e.g., Fritzsche et al., 2003), completing statistics coursework (e.g., Macher et al., 2012), as well as completing tests (e.g., undergraduates, Ariani & Susilo, 2018; graduate students, Onwuegbuzie, 2004). Relatedly, procrastination has been found to positively correlate with feelings of worry (Stöber, & Joormann, 2001) leading to impaired decision-making (Spada, Hiou, & Nikcevic, 2006) due to rumination (Constantin et al., 2018). Similarly, students have also been found to procrastinate due to fear of failure in an effort to avoid failure or negative evaluation feedback (e.g.,

undergraduate students: Haghbin et al., 2012; Solomon & Rothblum, 1984; Steel, 2007, graduate

students: Onwuegbuzie, 2004).

Although most of the research on the association between academic procrastination and

negative affect has been conducted on anxiety, studies also show academic procrastination to

correspond significantly with feelings of boredom (Blunt & Pychyl, 1998, Ferrari, 2000;

Vodanovich & Rupp, 1999). According to Blunt and Pychyl (1998), students may find it difficult

to work on tasks that are perceived as boring when less boring alternatives are present.

Furthermore, procrastination has shown to relate to specific components of boredom proneness

including perceived lack of external motivation and shortage in an ability to generate internal

interest (Vodanovich & Rupp, 1999). According to Lavoie and Pychyl (2001), although students

who engage in procrastination use less boring, more pleasurable tasks to distract themselves from

their negative moods, the short-term enjoyment associated with these more pleasant tasks

eventually diminishes and is replaced with longer-term feelings of regret and guilt.

Findings further show academic procrastination in undergraduates to be positively related

to shame-proneness (Fee & Tangney, 2000). According to Fee and Tangney (2000), whereas

both shame and guilt are self-conscious, self-evaluative emotions, with most research neglecting

the role of shame and focusing principally on guilt (Blunt & Pychyl, 2000; Ferrari, 1991;

Reinecke et al., 2014), they in fact found shame to be a significantly better predictor of academic

procrastination than feelings of guilt. A recent study by Martinčeková and Enright (2018) also

found procrastination to be positively associated with shame-proneness, but not guilt-proneness.

Concerning other negative emotions, anger has also been shown to negatively correlate with

academic procrastination, with frequent procrastination corresponding with greater anger (and

anger suppression; Ferrari & Olivette, 1994). In summary, published research to date has

consistently found academic procrastination to be related to various emotional states (both positive and negative) in both undergraduate and graduate student populations.

Demographic variables. Lastly, demographic variables are often measured alongside the aforementioned psychosocial variables in relation to academic procrastination, and typically include population variables such as age, gender, and ethnicity (Kim & Seo, 2015; Özer et al., 2009; Prohaska, Morrill, Atiles, & Perez, 2000). With respect to age, some findings show younger students to be more likely to procrastinate (Kim & Seo, 2015; Ponnet, Wouters, Walrave, Heirman, & Van Hal, 2015; Prohaska et al., 2000; Steel, 2007; van Eerde, 2003), whereas others find passive procrastination to increase with students' age (Cao, 2012; Rabin et al., 2011). As an example, Beswick et al. (1988) found students aged 21 and older to be more likely to procrastinate as compared to younger students.

Concerning gender differences, one study showed females to report greater procrastination than males in STEM (science, technology, engineering, and mathematics) disciplines due to stereotype threat (Deemer et al., 2014). However, other studies show male students to be more likely to procrastinate than females (Özer et al., 2009; Senécal et al. 1995), or no gender differences (Akinsola, Tella, & Tella, 2007; Johnson & Bloom, 1995). Academic procrastination has also been found to be differentially related to specific outcomes for male vs. female students, with procrastination showing positive relations with discrimination, homesickness, and risk-taking for males, and instead being positively linked to culture shock, academic self-efficacy, and fear of failure for females (Lowinger et al., 2014; Özer et al., 2009).

Finally, there are mixed findings regarding academic procrastination tendencies as a function of ethnicity. For example, although Clark and Oliver (1994) showed no differences in procrastination when replicating findings from Solomon and Rothblum (1984) specifically with

African-American students, Prohaska et al. (2000) found students born within the United States to score higher on procrastination than immigrant students. International research by Klassen et al. (2010) further showed Canadian and Singaporean students to procrastinate differently on writing tasks by getting food and drinks, or taking a nap, respectively. Existing research thus shows conflicting findings regarding the relationship between academic procrastination and specific demographic variables, with further research required to better understand why these discrepancies exist, and whether or not procrastination tendencies differ between students of different ages, genders, and ethnicities.

External Antecedents and Correlates

Contextual or situational factors encompass antecedents of procrastination found in students' social environments (Steel, 2007). Task-related antecedents are the most often reported contextual precursors to procrastination (Klingsieck et al., 2013; Solomon & Rothblum, 1984; Steel, 2007). More precisely, the specific task-related antecedent most frequently described is task aversiveness, which is defined in terms of how pleasant or unpleasant a task is perceived to be (undergraduate students: Blunt & Pychyl, 2000; Ferrari, Keane, Wolfe, & Beck, 1998; Solomon & Rothblum, 1984; see also task difficulty, Schraw et al., 2007; graduate students: Onwuegbuzie, 2004). Students are more likely to procrastinate on tasks they perceive as unpleasant or unenjoyable (Lay, 1992; Milgram, Sroloff, & Rosenbaum, 1988; Pychyl, Lee, et al., 2000). Furthermore, tasks are also avoided because they are perceived as confusing, difficult, stressful, important, or not requiring enough skills (Ackerman & Gross, 2005; Ferrari & Scher, 2000; Pychyl, Lee, et al., 2000; Sénecal et al., 1995).

Concerning the impact of educational rewards on procrastination, Steel (2007) found the timing of rewards/punishments to lead to procrastination. Also, academic tasks that students

procrastinate on earlier in the semester tended to be rated as unpleasureable by students, whereas later in the term, pleasantness had no bearing on their decision to procrastinate (Ferrari & Scher, 2000). Students have also been found to be less likely to engage in procrastination if they are aware of potential rewards for starting their work earlier (Ackerman & Gross, 2005). Relatedly, students tend to be less motivated by rewards that are distant in the future; a process referred to as temporal discounting (Pychyl, 2013; Schouwenburg & Groenewoud, 2001) with research showing academic procrastination to be positively associated with temporal discounting (Howell et al., 2006). In other words, students have been found to postpone academic tasks when the rewards (e.g., grades on exams) are in the distant future, and work on their assignments more frequently when the deadlines, and associated rewards, are near (Howell et al., 2006).

In addition to task- and award-related antecedents, social aspects of students' learning environments have similarly been shown to influence academic procrastination. More specifically, students are more likely to engage in procrastination when others praise them for "getting away with it" (Klingsieck et al., 2013), with findings showing significant others' attitudes towards procrastination (e.g., "good job getting away with it!") to influence procrastination and others who exhibit this behaviour to be seen as role models. Students who perceive their educational environments as fostering their advancement in learning are also less likely to engage in procrastination (Klingsieck et al., 2013), with specific elements of classroom climate such as instructor support and academic pressure to succeed being negatively correlated with procrastination (Corkin, Yu, Wolters, & Wiesner, 2014). It is important to note that perceptions of one's ability (self-efficacy) have been found to mediate the relationship between instructional support and procrastination, with students' perceptions of value mediating the effects of instructor support on procrastination, suggesting that personal antecedents of

procrastination may help explain some of the supposed relationships between contextual factors and academic procrastination (Corkin et al., 2014).

In addition to the learning environment, school admission standards can also play a part in students' procrastination behaviours. Ferrari and colleagues (1998) showed that students from selective colleges reported higher levels of procrastination than students from nonselective colleges, with this finding assumed to be due to differences in students' work ethics (i.e., overachievers applying to more selective institutions). Students from nonselective colleges were also shown to report more excuses for their procrastination, as well as stronger links between procrastination and fear of failure and social disapproval, whereas students from a selective college reported task aversiveness as the main reason for postponing their work (Ferrari et al., 1998). As demonstrated by these findings, external factors such as task and school characteristics, educational reward structures, and social interactions with peers and instructors, may also influence academic procrastination, with these effects potentially mediated by internal psychological variables.

Academic Emotions and Procrastination

As previously mentioned, procrastination involves cognitive, behavioural, and affective components (Solomon & Rothblum, 1984). With respect to the affective component, understanding how students' emotions related to their procrastination is of particular interest in that there appears to be an integral paradox (Pychyl, Lee, et al., 2000). Although students use procrastination as a way of regulating negative emotions elicited by undesirable or unpleasant tasks (Blunt & Pychyl, 1998), valuing short-term mood repair over task completion (Pychyl, 2013), this temporary reduction of negative emotions also results in compromised long-term

goals. Nevertheless, as students are prone to repeating behaviours that are rewarded, this momentary emotional reward inherently reinforces procrastination behaviour (Pychyl, 2013).

Moreover, findings also suggest that students are not simply shifting the burden of completing the task and the accompanying stress from the present to a future date by engaging in academic procrastination, they are also increasing the severity of stress experienced closer to the academic deadline (Tice & Baumeister, 1997). Although students procrastinate in hopes that they will later want to complete the task (i.e., "I'll want to do it later"), research shows these emotion forecasts to typically be inaccurate (Eni-Olorunda, & Adesokan, 2015; Pychyl, 2013; Wilson & Gilbert, 2003). Students thus tend to underestimate the power of external factors on their academic circumstances (e.g., task difficulty), and when procrastinating focus instead on their present emotions in estimating future affective states (Pychyl, 2013). Therefore, not only is procrastination used as a means of avoiding negative emotions, procrastination may also cause or exacerbate negative emotions. However, despite theoretical assertions and empirical findings consistently implicating students' emotions both as a cause of procrastination (e.g., misregulation hypothesis), and consequence of this behaviour, empirical work to provide evidence of these bidirectional links has yet to be conducted. Additionally, whereas negative emotions concerning testing have been examined in relation to academic procrastination, how students' positive emotions are linked with academic procrastination, and how both positive and negative emotions specifically concerning the learning process correspond to academic procrastination, remain unexplored.

Defining students' emotions. In contemporary educational research, Scherer (2005) defines emotions experienced by students in academic achievement settings as multifaceted experiences that involve cognitive, neurophysiological, motivational, motor expression, and

affective expression components. For example, the anxiety experienced by a student before an exam could consist of worrying about failing the exam (cognitive component), increased sweating/heart rate (physiological component), an instinct to escape the situation (motivational component), anxious facial appearance (motor expressive component), and feeling nervous/tense (affective expression component; Pekrun & Linnenbrink-Garcia, 2012). With respect to their academic consequences, students' achievement emotions, defined as emotions directly related to achievement activities and/or outcomes (Pekrun, 2006), have also been found to impact the motivational, cognitive, and monitoring processes involved in learning and performance, and further influence their psychological well-being and overall life satisfaction (Pekrun, 2006). Whereas most research on achievement emotions has understandably focused on how they correspond with academic achievement outcomes (i.e., grades), it is important to note that measures assessing achievement emotions have in recent years moved beyond emotions concerning testing (e.g., anxiety) to encompass various aspects of the learning process (e.g., studying, Putwain, Sander, & Larkin, 2013; homework, Goetz, Nett, Martiny, Hall, Pekrun, Dettmers, & Trautwein, 2012; moderating effects of subject area, Goetz, Frenzel, Pekrun, Hall, & Lüdtke, 2007). Emotions pertaining to achievement activities include examples such as anxiety or pride while taking a test, boredom or enjoyment experienced in class, as well as anger or hope while writing a term paper. Given these developments, it is now possible to explicitly examine how various learning-related cognitions and behaviours, including academic procrastination, correspond with not just general negative affect but also positive emotions as experienced by students with respect to specific aspects of the learning process.

  With respect to other ways in which students emotions have been conceptually differentiated, it is commonly proposed that there are four distinct types of emotions related to

students' learning including emotions not only connected to achievement outcomes but also epistemic emotions, topic-specific emotions, and social emotions (Pekrun & Linnenbrink-Garcia, 2012). As mentioned previously, achievement emotions are emotions that are tied to any achievement situation (e.g., enjoyment when learning for a test, shame when experiencing failure on an assignment). In contrast, epistemic emotions are more specific in referring to "emotions that arise out of information-oriented appraisals about the alignment or misalignment between new information and existing beliefs, existing knowledge structures, or recently processed information" (Muis, Chevrier, & Singh, 2018, p. 169), such as surprise when learning *new* content that counters what one may expect or one's previous knowledge on a given topic. When students are learning, they can be understood as experiencing achievement emotions or epistemic emotions, depending on the focus of their attention (Pekrun & Linnenbrink-Garcia, 2012). For example, when a student cannot find an answer to a problem, their frustration can be classified as an epistemic emotion if their focus is on the cognitive incongruity of failing to solve the problem. Alternatively, their frustration could be classified as an achievement emotion if their focus is on the personal failure in being unable to solve the problem. .

The last two types of emotions that are commonly explored in student populations include topic emotions related to specific content presented in class (e.g., empathy for a character in a novel), and social emotions that relate directly to peers or teachers in classroom settings (e.g., gratitude, compassion; Pekrun & Linnenbrink-Garcia, 2012). Topic emotions are emotions that are triggered by the specific content being learned, and unlike achievement emotions and epistemic emotions, are not conceptualized as directly associated with learning processes. In addition, given that learning is situated within social environments, academic settings necessarily also elicit emotions about other people. More specifically, students may experience social

emotions that are achievement-specific (e.g., envy or empathy pertaining to other students'

successes and failures), as well as non-achievement social emotions (e.g., affection for another

student or teacher; Hareli & Weiner, 2002; Weiner, 1985, 2007). In order to further understand

and conceptualize the various components/types of emotions experienced by students, as well as

how they are predicted by specific variables (e.g., cognitions regarding academic tasks such as

value or control) and how they predict learning behaviours (e.g., studying, procrastination),

specific theoretical perspectives warrant discussion as outlined below.

Theoretical perspectives on academic emotions. According to arguably one of the most

influential theories of emotions in the psychological literature, the Triple A Theory of emotions

(Lazarus & Folkman, 1984) proposes that a given difficult situation should instigate a cognitive

appraisal (primary appraisal), in which the individual evaluates the extent to which a given

experience is aversive or personally threatening in nature. Moreover, if the situation is

sufficiently challenging, individuals are further required to assess whether they have adequate

resources to control or cope with the situation (secondary appraisal). If one perceives their

coping resources to be inadequate, this creates a state of *anxiety* that, in turn, leads to *avoidance*

of the situation. This is particularly true in academic settings, since academic tasks can be

extremely stressful for students (Milgram & Tenne, 2000). For example, findings show that

motivation towards school and interpersonal relationships leads to role conflict (appraisal results

in tension or anxiety) and greater academic procrastination (task avoidance; Senécal et al., 2003).

If a student is studying for an important test and receives a call from a friend to go out to a social

gathering, he or she should experience negative and conflicting emotions leading to avoidance of

the academic task. In this example, the student is using avoidance as a tactic to help avoid the

negative emotions, not knowing that this short-term relief will come at the cost of feeling worse

off for their action in the future. In line with the misregulation hypothesis described above, students who experience negative emotions, such as anxiety, are more likely to procrastinate on their academic tasks so as to avoid this unpleasant feeling.

Following from appraisal theories that account for relations between emotions and their cognitive antecedents as well as behavioural outcomes, the role of emotions in educational settings has most explicitly been examined to date as part of the Control-Value Theory of Achievement Emotions (Pekrun, 2006). This theory provides a framework to explain how students' achievement emotions are elicited by appraisals of control (similar to secondary appraisals) and value (similar to primary appraisals; Lazarus & Folkman, 1984). Whereas subjective perceptions of control pertain to expectations of success due to one's learning behaviours, students' subjective perceptions of value typically refer to the personal importance of success on a given academic outcome. Situation-outcome expectancies (e.g., expectation that an exam will be failed if no studying is done), action-control expectancies (e.g., belief in one's abilities to initiate/perform required learning behaviours; cf. self-efficacy), and action-outcome expectancies (e.g., expectation that one's actions will elicit positive or negative outcomes, such as a belief that studying will result in good grades) are further proposed in this model to interact with appraisals to predict emotions. For example, high success expectancies combined with high perceived control should result in feelings of anticipatory joy, whereas low perceived control combined with low expectancy for success should result in feelings of hopelessness.

According to this model, achievement emotions can also be subdivided in two main ways. First, this model asserts that emotions can be sorted based on valence (positive vs. negative, or pleasant vs. unpleasant), and activation (elicits action vs. disengaging; Pekrun, Frenzel, Goetz, & Perry, 2007). Second, this model further differentiates emotions according to the type of

academic element the emotion is focused on (learning activity vs. achievement outcome) and

their temporal focus (future vs. past). Prospective outcome emotions pertain to future

achievement outcomes (e.g., hope, anxiety concerning an upcoming test) and are proposed to be

determined by a students' perceived control over academic outcomes. Retrospective outcome

emotions instead pertain to past achievement outcomes (e.g., guilt or relief after receiving test

feedback) and are assumed to be determined by students' more specific perceptions as to the

distinct causes of their performance, specifically if they believe these outcomes to be caused by

themselves, or other people (cf. locus of control, Rotter, 1966; causal attributions, Weiner, 1985).

Finally, similar to outcome-focused emotions, activity emotions are proposed to be

predicted by appraisals of control and value. Activity-related emotions focus on students'

learning behaviours rather than achievement outcomes per se (e.g., boredom or enjoyment during

class or while studying; similar to the concept of "flow"; Csikszentmihalyi, 2000). According to

Pekrun, Goetz, Titz, and Perry (2002), as most academic emotions are experienced

predominantly in three academic environments, namely the classroom, studying outside of class,

and while taking exams, activity emotions would be experienced typically outside the classroom

while studying. The specific proposed links between specific emotional experiences and each

combination of valence, object/temporal focus, as well as perceived control and value as

proposed in Pekrun's (2006) Control-Value Theory are outlined in Table 1.

Concerning the interplay between valence and activation, positive emotions are outlined in

this model as either activating (i.e., increase in physiological measures of arousal, such as heart

rate when experiencing enjoyment, hope, or pride; Pekrun, 2014) or deactivating in nature (i.e.,

decrease in physiological arousal, such as relaxation when experiencing relief). Positive

activating emotions are further assumed to draw attention to the learning task, and also increase

Table 1

Pekrun's Control-Value Theory

Object focus	Appraisals		Emotion
	Value	Control	
Outcome/prospective	Positive (success)	High	Anticipatory joy
		Medium	Hope
		Low	Hopelessness
	Negative (failure)	High	Anticipatory relief
		Medium	Anxiety
		Low	Hopelessness
Outcome/retrospective	Positive (success)	Irrelevant	Joy
		Self	Pride
		Other	Gratitude
	Negative (failure)	Irrelevant	Sadness
		Self	Shame
		Other	Anger
Activity	Positive	High	Enjoyment
	Negative	High	Anger
	Positive/Negative	Low	Frustration
	None	High/Low	Boredom

Note. Adapted from "The Control-Value Theory of Achievement Emotions: Assumptions, Corollaries, and Implications for Educational Research and Practice," by R. Pekrun, 2006, *Educational Psychology Review, 18,* p. 320.

flow, motivation, interest, the use of effective learning strategies, and efficient self-regulated learning (Pekrun, 2014). However, experiencing deactivating positive emotions (e.g., relief) can reduce students' attention and motivation towards a given task (Pekrun & Stephens, 2010).

Similarly, negative emotions may also be either activating (i.e., increased heart rate when experiencing anxiety, anger, or shame) or deactivating (i.e., decrease arousal when experiencing boredom or hopelessness), with both activating and deactivating negative emotions drawing students' attention away from the learning process (e.g., anxiety due to a bad grade leading to worry about future failure, boredom leading to daydreaming instead of studying). According to Pekrun et al. (2002), negative emotions can also influence subsequent motivation levels, with activating emotions such as anxiety and shame reducing interest, and deactivating negative emotions such as boredom reducing persistence (Pekrun, 2014). Conversely, activating positive emotions such as enjoyment of learning are assumed to enhance motivation to learn, and positive achievement emotions such as enjoyment and hope should facilitate optimal self-regulation, whereas negative emotions such as anxiety and boredom should correspond with lower motivation and poorer self-regulation. However, some researchers posit that negative emotions (e.g., anger, anxiety, shame) are able to trigger extrinsic motivation in students who want to avoid failure (Pekrun, Lichtenfeld, Marsh, Murayama, & Goetz, 2017).

With respect to potential links between Pekrun's Control-Value Theory of Achievement Emotions and procrastination behaviours, students' emotional experiences when studying outside of the classroom (vs. learning in class or while taking tests) should be especially relevant to procrastination given that behaviour is specifically disruptive of the learning process. Academic procrastination would also be expected to significantly correspond with activity emotions that are specifically identified in this model as occurring during the learning process (e.g., boredom,

Pychyl, Lee, et al., 2000). However, procrastination would similarly be expected to correspond with outcome-related emotions, with students who procrastinated on prior academic tasks likely to feel more intensely about their performance (e.g., higher shame, Fee & Tangney, 2000) as would students who are procrastinating on future tasks (e.g., lower hope, Zhou & Kam, 2016). Finally, this model asserts that whereas maladaptive behaviours such as procrastination should correspond with negative emotions (e.g., anxiety), it further suggests that positive emotions should also be significantly negatively related to procrastination due to demonstrated links between positive emotions and optimized learning processes. In sum, although Pekrun's model does not capture all emotions previously assessed in relation to academic procrastination (e.g., guilt), this conceptual framework has clear implications for how to optimally assess emotions in relation to procrastination and offers a useful starting point for delimiting the types of emotions potentially related to procrastination as well as possible mechanisms underlying these relations (e.g., attention, motivation, learning).

The Present Study

As outlined in the preceding overview of existing theory and empirical research on academic procrastination, these behaviours not only impede students' learning but also have negative consequences for their emotional well-being. Surveys have revealed that students in both undergraduate and graduate populations are also aware that these behaviours are problematic and consistently desire to change them. In order to find solutions for academic procrastination that target students' emotional experiences, researchers must first differentiate the emotional antecedents from the consequences of academic procrastination. Unfortunately, no research efforts to date have examined the directionality of the relationship between academic procrastination and academic emotions so as to ascertain whether students' emotional

experiences are best understood as influencing or being influenced by their procrastination, or if a bidirectional relationship exists between these processes.

Studies investigating the associations between academic procrastination and emotions have commonly reported cross-sectional findings making it difficult to determine if certain emotions influence academic procrastination, and/or vice versa, over time. Whereas researchers have commonly described academic procrastination and emotions in terms of their assumed roles as antecedents or consequences, findings to date have primarily been correlational in nature. For example, just as a positive correlation between anxiety and academic procrastination may suggest that students are engaging in procrastination because they have anxiety, it may alternatively be the case that their anxiety is causing their procrastination (e.g., as a response intended to reduce anxiety levels). Existing research on academic procrastination in relation to students' emotional experiences is further limited in that studies have to date explored only a limited range of emotions, with a predominant emphasis on anxiety and related constructs (e.g., stress, worry). To remedy these issues, the present research utilized a longitudinal methodological approach wherein the reciprocal linkages between academic procrastination and a range of specific learning-related emotions could be explored.

An additional notable gap in the existing research literature on procrastination is that most studies investigating the associations between academic procrastination and emotions have focused on undergraduate students. As reflected in the preceding literature review, over 90% of existing studies on procrastination and emotions in students have looked at the interplay between these variables in solely undergraduate samples. Accordingly, despite research showing that many graduate students similarly do not possess adaptive coping skills to help mitigate inclinations to procrastinate on their academic tasks (Alexander & Onwuegbuzie, 2007), studies

on how graduate students emotions relate to their procrastination behaviours are scant.

Therefore, the present study not only recruited undergraduate students but also graduate students internationally to more comprehensively explore the extent to which associations observed between academic procrastination and emotions in undergraduates may generalize to graduate students at more advanced levels of study. In conclusion, not only are students who procrastinate putting themselves at risk of performing poorly on their academic tasks, they are also jeopardizing their well-being and psychological health (Alexander & Onwuegbuzie, 2007). Concerning the potential detrimental effects of procrastination on students' emotions, or vice versa, these inferences need to be empirically justified in order to best determine if optimal assistance to struggling students should focus on, for example, emotion regulation strategies (emotions as antecedent). In an effort to fill these gaps in the existing procrastination literature, this dissertation study examined the associations between academic procrastination and emotions over time in both undergraduate and graduate students.

More explicitly, the present dissertation studies consisted of two three-phase longitudinal examinations of academic procrastination tendencies and corresponding achievement emotions in Fall 2017 (September, October, and November) conducted separately with undergraduate and graduate student samples. As the aim of the present study was to understand and examine the potential directional relationships between academic procrastination and emotions over time, structural equation modeling was conducted for each sample to evaluate cross-lagged, panel models in which the directionality, and bidirectionality, of these relations could be assessed. Based on the aforementioned research on academic procrastination and emotions, three general research questions were proposed in the context of more specific hypotheses following from existing theoretical assertions or existing research specific to a given emotional experience.

Research Question 1: Frequency of Procrastination Behaviours

The first research question asked: *What are differences with respect to the prevalence/frequency of academic procrastination between graduate and undergraduate students when they are writing term papers, studying for exams, and keeping up with their weekly readings?* Moreover*, do students perceive their procrastination on these tasks as problematic and do they wish to change them?* According to Solomon and Rothblum (1984) writing term papers, studying for exams, and keeping up with weekly readings (vs. administrative, attendance, and other school activities) represent the most important academic tasks for undergraduate students as they largely determine undergraduates' course grades. Of these three academic tasks, Solomon and Rothblum (1984) and Kachgal, Hansen, and Nutter (2001) found undergraduates to report the highest frequencies of procrastination on writing term papers (46% and 59%, respectively). In contrast, of the limited research that has examined procrastination on specific academic tasks among graduate students, Onwuegbuzie (2004) found graduate students to report procrastinating most frequently on keeping up with weekly readings (60%). The present study aimed to provide further evidence regarding the prevalence of procrastination on these academic tasks among graduate and undergraduate students, while trying to also understand the representativeness of the present samples.

Hypothesis 1a: Differences in procrastination frequencies between specific tasks for undergraduate vs. graduate students. Following directly from the aforementioned existing research on task-specific procrastination in academic contexts, it was hypothesized that undergraduate students would procrastinate most when writing term papers (consistent with Kachgal, 2001; Solomon & Rothblum, 1984), whereas graduate students would procrastinate most on keeping up with their weekly readings (as found by Onwuegbuzie, 2004) based on the

assumption that graduate students should more frequently encounter tasks related to academic readings (e.g., comprehensive examination work) than writing term papers or studying for exams due to more limited coursework.

Hypothesis 1b: Differences in perceptions of procrastination as being problematic between specific tasks for undergraduate vs. graduate students. Following from the rationale presented in Hypothesis 1a, graduate students were expected to perceive their procrastination with respect to keeping up with academic readings to be more problematic than other academic tasks (as was found by Onwuegbuzie, 2004). In contrast, undergrads were expected to perceive their procrastination with respect to writing their term papers as more problematic than studying for their exams or doing their reading assignments (as found by Solomon & Rothblum, 1984).

Hypothesis 1c: Differences in desire to reduce procrastination frequencies between specific tasks for undergraduate vs. graduate students. Following from the rationales presented in Hypothesis 1a and 1b, undergrads were expected to report a desire to reduce their procrastination with respect to writing their term papers more so than for other academic tasks (e.g., course exams or weekly readings) as was found by Solomon and Rothblum (1984). However, graduate students were expected to report wanting to decrease their procrastination mainly with respect to their weekly readings as opposed to studying for exams or completing writing papers (similar to Onwuegbuzie, 2004).

Research Question 2: Valence of Procrastination/Emotion Relations

The second research question asked: *What is the relationship between academic procrastination and students' achievement emotions?* This question follows from previous work on the connections between academic procrastination and emotions, and aimed to expand existing findings by considering additional affective variables beyond those measured in

previous studies. More specifically, this research assessed not only negative and positive

emotions in undergraduates and graduate students related to learning and achievement as

outlined in the Control-Value Theory of Achievement Emotions (e.g., pride; Pekrun, Lichtenfeld,

Killi, & Reiss, 2007), but also students' feelings of guilt that have previously been assessed in

relation to procrastination behaviours (e.g., Blunt & Pychyl, 2000; Pychyl, Lee, et al., 2000;

Schraw et al., 2007). To answer this question, zero-order correlations between all study variables

were investigated. Overall, it was anticipated that more adaptive emotions (i.e., positive) would

be negatively associated with academic procrastination, whereas more maladaptive emotions

(i.e., negative) would be positively associated with academic procrastination.

       Hypothesis 2a: Valence of relations with positive emotions. It was hypothesized that

enjoyment, hope, and pride would be negatively associated with academic procrastination. More

specifically, enjoyment was expected to negatively correlate with academic procrastination,

following from previous research showing a positive correlation between task aversiveness

(defined in terms of how pleasant/unpleasant a task is perceived as) and academic procrastination

(Lay, 1990; Solomon & Rothblum, 1984). This assertion was further based upon findings

showing a negative relationship between intrinsic motivation and academic procrastination

(Rakes & Dunn, 2010; Sims, 2014), as well as a positive relationship between enjoyment and

self-regulation success (i.e., negatively with self-regulation failure; Pekrun, 2014; Pekrun et al.,

2002). Hope was also anticipated to negatively correlate with academic procrastination based on

research with undergraduate students (Zhou & Kam, 2016) and graduate students (Alexander &

Onwuegbuzie, 2007) where negative relations were observed. Lastly, as no previous studies have

examined the correlations between pride and academic procrastination, this emotion was also

hypothesized to correlate negatively with academic procrastination given the aforementioned

findings with other positive emotions showing negative associations with academic

procrastination.

Hypothesis 2b: Valence of relations with negative emotions. It was hypothesized that

anger, anxiety, boredom, shame, guilt, and hopelessness would be positively associated with

academic procrastination. More specifically, as a negative activating emotion, anger was

anticipated to negatively correlate with academic procrastination, based on findings showing

frequent procrastination to correspond with greater anger and anger suppression (Ferrari &

Olivette, 1994). Procrastination was also expected to be positively associated with anxiety

(Constantin et al, 2018; Glick et al., 2014; Solomon & Rothblum 1984) based on extensive

research showing students who experience anxiety to procrastinate on academic tasks (e.g.,

writing anxiety, Fritzsche et al., 2003; statistics anxiety, Macher et al., 2012; test and class

anxiety, Ariani & Susilo, 2018, Onwuegbuzie, 2000, 2004). It was further hypothesized that

academic procrastination would be positively associated with boredom, as found in previous

research with undergraduate students (Blunt & Pychyl, 1998; Blunt & Pychyl, 2000; Ferarri,

2000; Vodanovich & Rupp 1999). Additionally, shame was predicted to positively associate with

academic procrastination, based on findings showing undergraduate students' academic

procrastination to positively relate to shame-proneness (Fee & Tangney, 2000; Martinčeková &

Enright, 2018), with guilt also expected to be positively associated with academic procrastination

as consistent with existing findings (Blunt & Pychyl, 2000; Ferrari, 1991; Ferrari et al., 1998;

Hensley, 2016; Pychyl, Lee, et al., 2000; Reinecke et al., 2014; Schraw et al., 2007). Lastly,

although no previous studies have examined the correlation between hopelessness and academic

procrastination, hopelessness was hypothesized to positively correlate with academic

procrastination given negative relations between procrastination and hope (Alexander &

Onwuegbuzie, 2007) and the aforementioned research showing positive relations between

academic procrastination and other negative emotions.

Research Question 3: Directionality of Procrastination/Emotion Relations

The third research question addressed in the present dissertation was as follows: *What is*

the direction of the relationship between academic procrastination and emotions over time?

More specifically, do emotions predict academic procrastination, or does academic

procrastination predict emotions, and how do these relationships differ over time? To answer this

question, multiple sets of cross-lagged structural equation analyses were examined in which

procrastination was evaluated longitudinally alongside a range of specific achievement-related

emotions. Given the highly exploratory nature of this third research question, four competing

hypotheses regarding the directionality of effects were examined. With respect to the specific

valances implied in each directional hypothesis below, negative emotions were hypothesized to

positively predict academic procrastination, whereas positive emotions were assumed to

negatively predict academic procrastination.

Hypothesis 3a: Emotions predict procrastination. The first directional hypothesis was

that emotions could predict academic procrastination (Figure 1). Moreover, following from the

misregulation hypothesis (Balkis & Duru, 2016; Baumeister & Heatherton, 1996; Sirois &

Pychyl, 2013), students would be expected to engage in procrastination so as to relieve their

preceding negative emotions, meaning that emotions such as anxiety, anger, shame,

hopelessness, boredom, and guilt should precede academic procrastination. Similarly, higher

levels of positive emotions (e.g., enjoyment, hope, and pride) could also negatively predict

subsequent academic procrastination, given findings suggesting that students who engage in
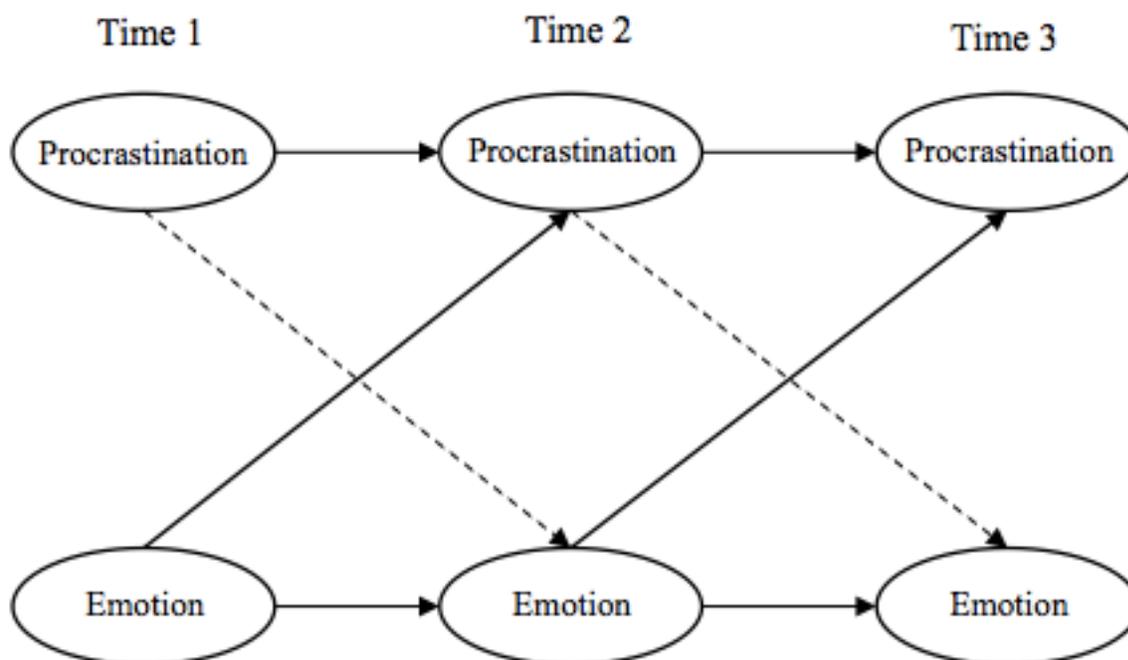
Figure 1. Hypothesized cross-lagged results showing a given emotion to predict procrastination over time.

procrastination do so as a result of lack of interest in their tasks (e.g., a lack of enjoyment of learning; Solomon & Rothblum, 1984).

Hypothesis 3b: Procrastination predicts emotions. It was additionally hypothesized that procrastination could predict emotions (Figure 2), following mainly from research on academic procrastination that has found procrastination to predict negative emotions, such as anxiety (e.g., regression analyses between procrastination and test anxiety, Saddler & Buley, 1999). Similarly, it is reasonable to anticipate that academic procrastination could lead to other negative emotions such as anger, shame, hopelessness, boredom, or guilt given that they share an underlying negative valence with anxiety. Conversely, higher levels of academic procrastination could also be expected to negatively predict positive learning-related emotions of opposite valence to anxiety (enjoyment, hope, and pride).
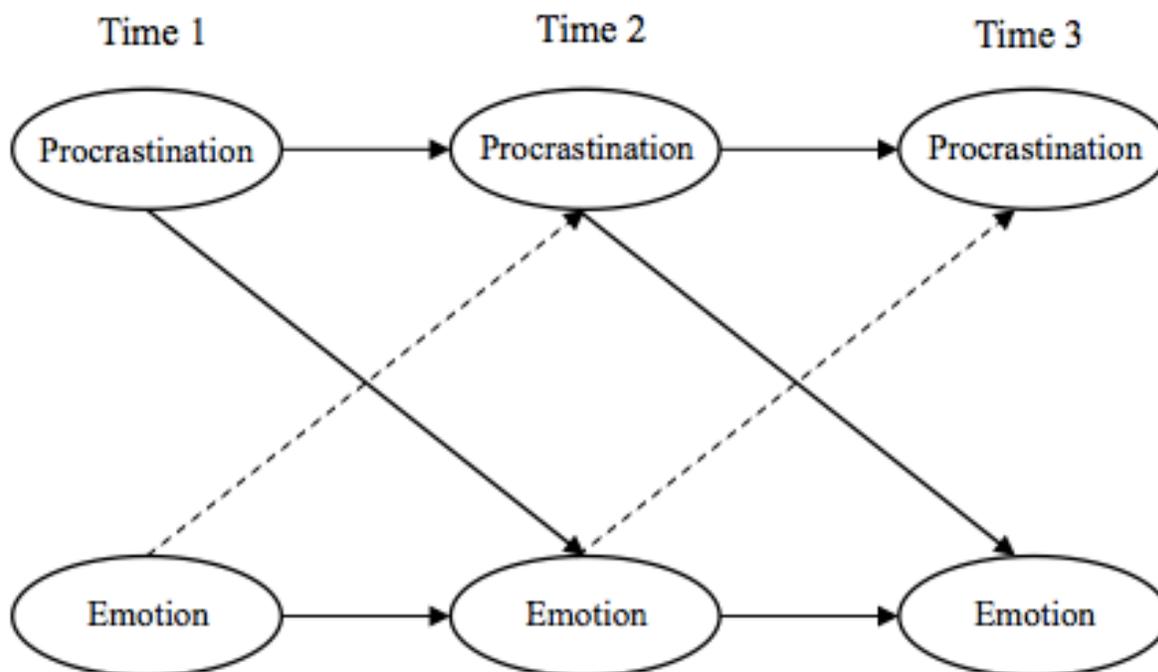
Figure 2. Hypothesized cross-lagged results showing procrastination to predict a given emotion over time.

Hypothesis 3c: Concurrent prediction. Concurrent directional relationships between academic procrastination and emotions were also testable hypotheses, such that the effects of each variable on the other may be observed simultaneously (Figure 3). This hypothesis was informed by findings from Balkis and Duru (2016) that showed negative affect (e.g., fear, irritability, nervousness) to be not only predicted by procrastination, but to also predict subsequent procrastination levels. Please note that this hypothesis asserts that beyond correlations between procrastination and emotions within a given assessment period (e.g., Time 1), significant relationships could be expected from procrastination at one assessment (e.g., Time 1) to emotions at the next (e.g., Time 2), and similarly, from emotions at the same initial assessment (e.g., Time 1) to procrastination at the next (e.g., Time 2; see Figure 3).
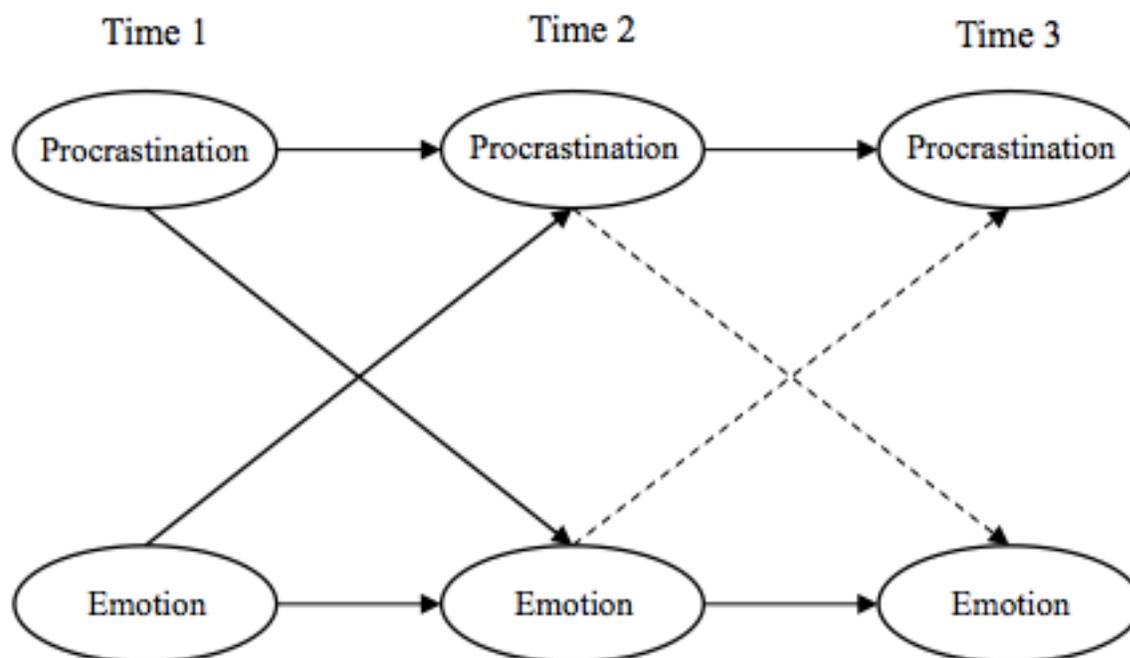
Figure 3. Hypothesized cross-lagged results showing concurrent predictive relationships between procrastination and a given emotion.

Hypothesis 3d: Sequential prediction. Lastly, sequential relationships between academic procrastination and emotions were also possible, such that each variable could predict the other at different times throughout the year (Figure 4). This hypothesis follows from existing literature showing students' anxiety to both predict (Saddler & Buley, 1999) and be predicted by academic procrastination (Solomon & Rothblum, 1984). However, this hypothesis is most closely derived from previous research suggesting that whereas academic procrastination early in the semester may be related to low levels of stress, procrastination later in the term is related to higher levels of stress (Tice & Baumeister, 1997). The sequence of this hypothesized direction of relations is thus depicted as follows: (1) procrastination$_{T1}$ → emotion$_{T2}$ → procrastination$_{T3}$, or (2) emotion$_{T1}$ → procrastination$_{T2}$ → emotion$_{T3}$.
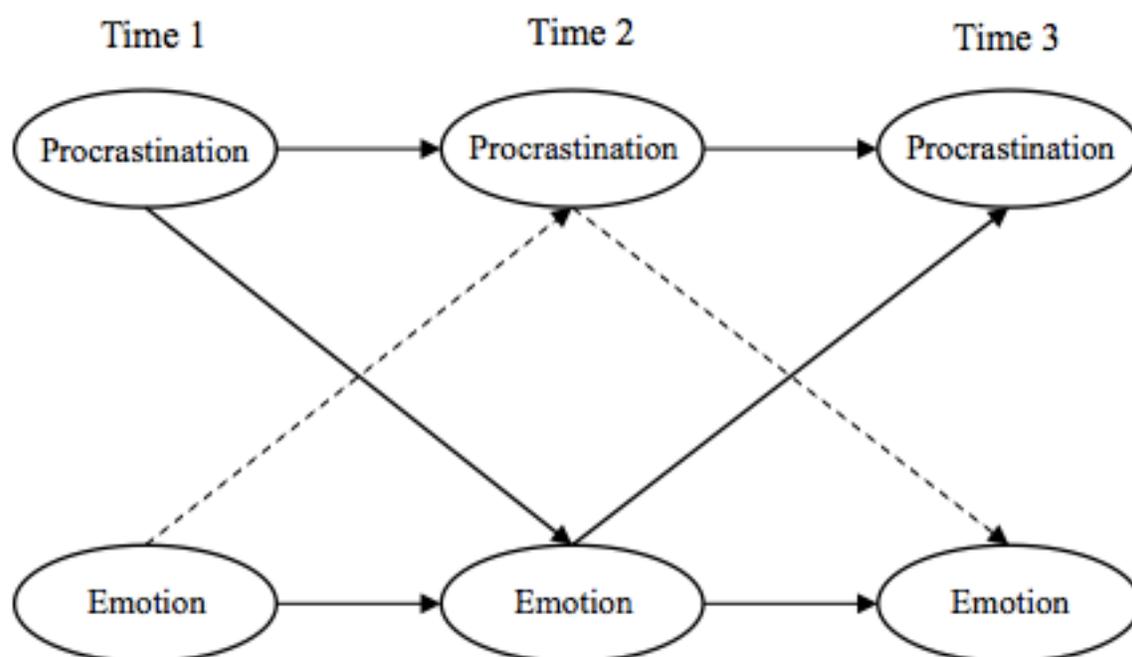
Figure 4. Hypothesized cross-lagged results showing sequential predictive relationships between procrastination and a given emotion.

Method

The present research involved two three-phase longitudinal studies. Graduate and undergraduate participants were asked to complete an online survey consisting of the following measures: demographic items, academic procrastination (The Procrastination Assessment Scale-Students, PASS; Solomon & Rothblum, 1984; Academic Procrastination State Inventory, APSI, Schouwenburg, 1992), learning-related achievement emotions (Achievement Emotions Questionnaire, AEQ; Pekrun et al., 2002), as well as an assessment of guilt (Harder & Lewis, 1987). Graduate and undergraduate students were recruited online via social media to complete the aforementioned assessments using the SurveyMonkey platform. Data were collected at three time points during Fall of 2017 (September, October, and November, 2017) to facilitate longitudinal analyses of the study hypotheses. Although both the undergraduate and graduate

samples received the same questionnaire items, the results of each sample are presented separately (graduate vs. undergraduate). Due to the under-examined nature of procrastination in graduate students, findings for the graduate student sample are presented first in Study 1, with findings obtained for undergraduate students presented in Study 2.

Measures

Demographic information. A 16-item questionnaire was administered to students, asking them to report their first name, last name, institutional e-mail address, secondary e-mail address, age, gender, country, relationship status, if English was their first language, if they were an international student, whether or not they had children, their education level, year in program, full-time/part-time student, and their family income. In addition, participants were asked if they agreed to be entered into a draw to win a cash prize in exchange for their participation.

Academic Procrastination

The *Procrastination Assessment Scale-Students* (PASS; Solomon & Rothblum, 1984) includes a subset of 18 items that examine the frequency of procrastination across six academic performance tasks: self-reported procrastination for writing a term paper, studying for exams, keeping up with weekly readings, academic administrative tasks, attendance tasks, and school activities. Given that the present research focuses on academic procrastination with respect to learning/studying behaviours, only items pertaining to the first three tasks were assessed to evaluate the first research question concerning procrastination on specific academic activities. Also, these three tasks were deemed as most important to students given that course grades are almost entirely based on these critical activities (Solomon & Rothblum, 1984). More specifically, this scale asked students to report how frequently they engaged in academic procrastination when writing term papers, studying for exams, and doing their weekly readings

on a 5-point Likert scale ranging from 1 (*never procrastinate*) to 5 (*always procrastinate*). In addition, participants were asked to indicate the degree to which they perceived their procrastination on each task as problematic and the degree to which they wished to decrease their tendency to procrastinate on each task, as measured on a 5-point Likert-type scale ranging from 1 (*not at all a problem*) to 5 (*always a problem*), and 1 (*do not want to decrease*) to 5 (*definitely want to decrease*), respectively.

The PASS, as the most widely used measure of academic procrastination, was used to answer the first research question since it directly assesses perceived academic procrastination with respect to specific tasks (writing term papers, studying for exams, and completing weekly readings). However, this measure was problematic for our second and third research questions for the following reasons. First, researchers typically create a total academic procrastination score by adding responses pertaining to procrastination frequency with responses pertaining to the problematic nature of their procrastination (adding items one and two). Whereas the second question addresses the perceived aversiveness of procrastination on each task (viewing it as negative), only the first question directly measures procrastination frequency for each task ("How often do you procrastinate on this task"). Therefore, aggregating these items would confound frequency with perceived emotional valence of procrastination thus confounding the aim of this study to evaluate frequencies of self-reported academic procrastination behaviours as *distinct from* its emotional components so as to explicitly evaluate the hypothesized correspondence between procrastination and emotion variables.

Second, preliminary statistical comparisons across the three items relating to procrastination frequency, and valence for each academic task showed large discrepancies between item responses that do not support their analysis as a composite variable (i.e., as in

Solomon & Rothblum, 1984). For example, responses to questions one and two showed that although graduate students frequently procrastinated when writing their term papers (62% reporting "almost always" or "always"), only a small minority believed this behaviour to be problematic (33.5%). Lastly, comparisons of the internal reliability coefficients showed a modified version of the PASS including only items reflecting the perceived frequency of procrastination for each of the three tasks (α = .68) to be substantially less reliable than an alternate, multi-item measure of procrastination behaviours related to studying, the Academic Procrastination State Inventory (APSI, 13 items; α = .88), suggesting that the APSI represents a more suitable, multi-item measure with which to assess academic procrastination frequency.

Accordingly, the *Academic Procrastination State Inventory* (Schouwenburg, 1992) was used to assess both graduate and undergraduate students' academic procrastination in the present studies when examining empirical evidence in support of the second and third research questions involving relations between procrastination frequency and students' emotional experiences. Whereas the complete APSI inventory includes 13 items measuring academic procrastination frequency, six items measuring fear of failure, as well as four items measuring a lack of motivation, only the initial frequency subscale was administered (α = .88). The scale preamble asked students to indicate, "How frequently last week did you engage in the following behaviors or thoughts?" on a 5-point Likert scale ranging from 1 (*not*) to 5 (*always*), with sample items including: "Had no energy to study"; "Prepared to study at some point of time but did not get any further"; and "Interrupted studying for a while in order to do other things." One of the scale items was reverse coded ("Studied the subject matter that you had planned to do"). Although this measure has been used to assess both state procrastination (e.g., at this moment; Krause & Freund, 2014) and trait academic procrastination (e.g., habitual; Eckert, Ebert, Lehr, Sieland, &

Berking, 2016), the present study utilized this scale to specifically measure trait academic

procrastination.

Academic Emotions

Students' emotions specific to academic learning processes were assessed using two sets of

measures to capture a variety of emotional experiences in academic contexts. First, academic

emotions were evaluated using a subset of 75 items from the *Achievement Emotions*

Questionnaire (AEQ; Pekrun et al., 2002), that pertained specifically to both negative and

positive emotions experienced by students while engaged in learning in academic contexts (vs.

while participating in class or taking tests). The following learning-related emotions were

assessed: enjoyment (10 items, $\alpha = .78$; e.g., "I look forward to studying"), hope (6 items, $\alpha = $

.77; e.g., "I have an optimistic view toward studying"), pride (6 items, $\alpha = .75$; e.g., "I am proud

of myself"), anger (9 items, $\alpha = .86$; e.g., "I get angry when I have to study), anxiety (11 items, α

$= .84$; e.g., "When I look at the books I have to read, I get anxious"), shame (11 items, $\alpha = .86$;

e.g., I feel ashamed"), hopelessness (11 items, $\alpha = .90$; e.g., "I feel hopeless when I think about

studying), and boredom (11 items, $\alpha = .92$; e.g., "The material bores me to death"). All items

were answered on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

The AEQ can be administered as a trait or state assessment of learning-related emotions,

and in the present research was used to evaluate students' emotions at the trait level (i.e., "Below

are specific questions about emotions you may experience while studying. Before answering the

questions on the following pages, please recall some typical situations of studying which you

have experienced during the course of your studies") so as to more directly align with the

retrospective, trait-like nature of the APSI procrastination measure. A subset of items from

Personal Feelings Questionnaire-2 (PFQ-2; Harder & Lewis, 1987) was additionally

administered to specifically assess students' feelings of guilt (an emotion not included in the

AEQ, but examined previously in relation to procrastination; see Blunt & Pychyl, 2000; Pychyl,

Lee, et al., 2000). The 22-item guilt subscale of the PFQ-2 included 6 items (α = .78; e.g.,

"Feeling you deserve criticism for what you did"), rated on a 5-point Likert scale ranging from 1

(*I do not experience the feeling*) to 5 (*I experience the feeling very strongly*).

Study 1: Graduate Students

Participants

The sample consisted of 824 graduate student participants who were recruited from 74

countries. Most participants were enrolled full-time (87%) at Canadian (13.4%) or American

post-secondary institutions (41.3%). The sample consisted of 659 females (80%), 141 males

(17%), and 20 non-binary and/or other individuals (2%), with 67% of the students stating that

English was their first language, and 40% identifying as an international student. Graduate

student participants reported being mostly single (40%) or in a serious relationship (34%), with

11.2% reporting having children. Ages ranged from 20 to 51 years old (M_{age} = 28.59), with most

participants holding a bachelor's degree (38%) or a master's degree (54.6%), and most

participants being in either the first (22%) or second year (15%) of a master's program. Reported

family incomes were as follows: <$20,000 (26%), $20,000 - $40,000 (25%), $40,000 – $60,000

(12%), $60,000 – $80,000 (7.2%), >$80,000 (15.1%), and 14.5% provided no response. Ten

participants were deleted from the sample because they indicated being either a postdoctoral

student or having already graduated from their graduate program.

Results

Data Screening

In accordance with Tabachnick and Fidell (2007), several steps were taken to ensure that the data were sufficiently cleaned and that underlying assumptions of parametric testing were met prior to conducting analyses with respect to data accuracy, missing data, participant attrition, outliers, normality, homoscedasticity, and linearity.

Data accuracy. The accuracy of the data were validated by proofreading the data entered within SPSS against the original items and via descriptive statistics of item frequencies to ensure data were within intended ranges (see Table 2 for descriptive statistics for the graduate student study including Cronbach's alpha, means, standard deviations, numbers of participants, numbers of items, and actual ranges).

Missing data. Since the participants were not required to answer all questions due to ethics requirements, some variables contained missing data. Overall, it appeared that most of the missing data were due to attrition (see section below entitled Participant Attrition for more information). At Time 1, only 4% of data were missing for variables assessed in the first half of the survey, whereas the missing values increased to 16% for measures administered in the last half of the questionnaire. An independent samples *t*-test was conducted comparing participants with complete versus incomplete data on the APSI procrastination total score (i.e., a dummy coded variable was created to compare students who completed past the second half of the survey vs. those who stopped before the half-way point). Results revealed a significant difference between these two groups on the APSI (< first half: $n = 80$, $M = 2.91$ vs. > first half: n

Table 2

Psychometric Properties of Study Variables (Graduate Students)

Variable	n T1	n T2	n T3	M T1	M T2	M T3	SD T1	SD T2	SD T3	α T1	α T2	α T3	# items	Actual range T1	Actual range T2	Actual range T3
Procrastination																
Academic	765	471	302	3.11	3.14	3.15	0.65	0.66	0.71	.88	.88	.91	13	1.30 - 4.90	1.20 - 4.80	1.30 - 4.90
Emotions																
Enjoyment	680	444	297	3.51	3.39	3.36	0.70	0.73	0.72	.83	.84	.85	10	1.40 - 5.00	1.00 - 5.00	1.20 - 5.00
Hope	685	444	297	3.21	3.18	3.21	0.87	0.89	0.84	.84	.86	.87	6	1.00 - 5.00	1.00 - 5.00	1.00 - 5.00
Pride	667	441	297	3.48	3.42	3.45	0.83	0.85	0.86	.80	.82	.85	6	1.00 - 5.00	1.00 - 5.00	1.00 - 5.00
Anger	682	444	294	2.04	2.03	1.92	0.83	0.86	0.75	.89	.90	.90	9	1.00 - 4.78	1.00 - 4.78	1.00 - 4.56
Anxiety	685	444	297	2.99	2.93	2.88	0.94	0.95	0.95	.87	.90	.90	11	1.00 - 5.00	1.00 - 5.00	1.00 - 5.00
Shame	685	444	297	2.83	2.84	2.76	1.07	1.11	1.10	.91	.93	.93	11	1.00 - 5.00	1.00 - 5.00	1.00 - 5.00
Hopelessness	685	444	297	2.37	2.38	2.34	1.05	1.09	1.07	.93	.94	.94	11	1.00 - 5.00	1.00 - 5.00	1.00 - 4.91
Boredom	685	444	297	2.33	2.31	2.23	0.87	0.88	0.86	.91	.93	.93	11	1.00 - 5.00	1.00 - 5.00	1.00 - 4.91
Guilt	642	432	296	2.89	2.77	2.66	1.06	1.09	1.11	.88	.90	.91	6	1.00 - 5.00	1.00 - 5.00	1.00 - 5.00

Note. *p < .05, **p < .01.

= 682, M = 3.13) showing participants who completed most or all of the survey to have

significantly higher levels of academic procrastination than students who quit the survey before

the midway point. However, no students were excluded from the main analyses due to the effects

size for the initial difference between these groups being notably weak in magnitude (η_p^2 = 0.01,

Richardson, 2011).

When analyzing structural models in AMOS (Version 22) with missing data, the program

is equipped to estimate means and intercepts with Full Information Maximum Likelihood

(FIML) that uses available cases to compute maximum likelihood estimates of missing cases.

This model-based approach thus uses the existing data to compute maximum likelihood

estimates of the parameters, which are the values to have most likely occurred in the data set

(Little, 2013). However, as using FIML on large sample sizes leads to the same results as using

other missing data approaches, such as multiple imputation (Little, 2013; Schafer & Olsen,

1998), no other data application methods were considered (i.e., mean substitution, regression

imputation, etc.).

Participant attrition. In addition to attrition within each time point, participant attrition

from one time point to the next was expected given the longitudinal nature of the study. For the

graduate student sample, 824 participants completed Time 1, whereas only 502 participants

completed Time 2 (39% attrition from Time 1) and 325 participants completed Time 3 (36%

attrition from Time 2). Multiple one-way ANOVAs revealed no differences between the

participants who completed all study phases and participants who quit the study prematurely on

academic procrastination, academic emotions, and critical demographic variables (e.g., age,

education level, year in program, and family income) at Time 1.

Outliers. Outliers were analyzed for all study variables (including academic procrastination, academic emotions, age, and gender). Several outliers were found assessed using z-scores. According to Tabachnick and Fidell (2007), standardized scores of +/- 3.29 are considered potential outliers in a given data set ($p < .001$, two tailed test).[1] Using this cutoff, one case was deleted for enjoyment at Time 1 (parcel 3, standardized z-score: -3.61, actual item value: 1), and seven cases were deleted for anger at Time 1 (parcel 3, standardized z-score: 3.41, actual item value: 5). For Time 2, two cases were removed for anger (parcel 3, standardized z-score: 3.49, actual item value: 5). For Time 3, eight cases were deleted for anger (two cases, parcel 2, standardized z-score: 3.44, actual item value: 5, six cases, parcel 3, standardized z-scores: 3.76 3.38, actual item value: 5, 4.67). In addition, 15 cases were removed for age (standardized z-scores: 6.20, 4.57, 4.42, 4.13, 3.83, 3.68, 3.54, and 3.39, actual item values: 71, 60, 59, 57, 55, 54, 53, and 52).[2]

Normality. Normality was assessed by investigating skewness, kurtosis, and probability plots. Using the descriptives function in SPSS, the values for skewness and kurtosis for all of the variables were acquired. Due to the large sample size, numerical values associated with skewness and kurtosis were not considered reliable (Tabachnick & Fidell, 2007), with formal approaches to testing normality (e.g., Shapiro-Wilk and Kolmogorov-Smirnov normality tests) also not ideal for larger sample sizes (Kim, 2013). Although there are slight variations in the methods/cutoff points currently used to assess skew and kurtosis (e.g., $z_{skewnes}$ and $z_{kurtosis}$ of +/- 1, Maffia, 2011; +/- 2 for skew and +/- 7 for kurtosis, Cohen, Cohen, West, & Aiken, 2003; Curran, West, & Finch, 1996; Hair, Black, Babin, & Anderson, 2010; Kline, 2011; West, Finch, &

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[1] Outliers were calculated both initially for total scales and once again after the parceling method was

[2] All multivariate outliers were retained given that removal of multivariate outliers can significantly reduce sample size, and in consideration of recent findings challenging the reliability of the Mahalanobis distance test with respect to false positives (Cousineau & Chartier, 2010; Tabachnick & Fidell, 2007).

Curran, 1995), it is recommended that for samples with greater than 300 participants, researchers should rely on the absolute values of skewness and kurtosis (Kim, 2013). According to this *absolute values criterion*, none of the study variables violated the assumption of normality (+/- 2 for skew and +/- 7 for kurtosis).

To further investigate normality, probability plots were used to compare the cumulative distribution of the data points to the cumulative distribution of a normal distribution (Hair et al., 2010). When looking at the probability plot of procrastination scores, the normal distribution scores are presented as a diagonal line and the actual scores for procrastination are compared to that line. Upon visual examination of the probability plots, all of the variables were normally distributed (i.e., the points on the plots were close to the points on the diagonal line). The points on the plots did not significantly go above or below the diagonal line (meeting the assumption of kurtosis), and the points did not significantly arc above or below the diagonal line (meeting the assumption of skewness).

Homoscedasticity. Homoscedasticity examines whether or not the scores on the dependent variables have equal levels of variance across the range of scores for the independent variables (Hair et al., 2010). Visual inspection of bivariate scatterplots displaying the standardized residuals of the errors by the regression standardized predicted scores showed homoscedastic patterns for all variables in the present data set (e.g., each endogenous variable in the main cross-lagged models presented below was assessed in conjunction with each exogenous variable: academic procrastination Time 1 by anxiety Time 2, academic procrastination Time 1 by anxiety Time 3, anxiety Time 1 by academic procrastination Time 2, anxiety Time 1 by academic procrastination Time 3, etc. for all other emotions). For each pair of variables assessed, the

points on scatterplots were equally dispersed (i.e., there was no pattern in the distribution of the

dots).

   Linearity. To examine underlying linearity of relations between key study variables,

multiple scatterplots were created to observe the relationships between procrastination and each

of the emotion variables. Results showed an oval-shaped pattern of responses for all

combinations of variables, demonstrating linear relationships between all variable combinations

assessed concurrently at the same time point (e.g., Time 1 procrastination with Time 1 anxiety,

Time 2 procrastination with Time 2 anxiety) and between variables across time points (e.g.,

Time 1 procrastination with Time 2 anxiety, Time 2 procrastination with Time 3 anxiety).

Preliminary Analyses

   Initial differences. Initial differences in the key self-report study measures (i.e., Time 1

academic procrastination, emotions) as a function of demographic variables were analyzed to

determine if confounding background variables were required to be included as potential

covariates. Given that a large number of comparisons were conducted, a Bonferroni correction

was performed, resulting in a new significance threshold of $p = .0056$. Bivariate correlations

were mostly non-significant for age, however weak correlations were significant between age

and anxiety ($r(685) = -.14, p < .001$) and shame ($r(680) = -.11, p = .004$). No significant

correlations were found between education level, year in program, or family income and the

study variables. Independent samples t-tests for gender differences showed no significant

differences on any study measure ($p > .0056$). Multiple one-way ANOVAs revealed statistically

significant differences between groups with respect to relationship status on academic

procrastination ($F(3, 745) = 6.51, p < .001$). Post hoc analyses revealed that students who were

single (*n* = 296, *M* = 3.22) were more likely to engage in academic procrastination than students who were married/civil union (*n* = 181, *M* = 3.00, *p* = .001).

Despite the present lack of statistical evidence to warrant the inclusion of age and gender as covariates, these demographic variables have nevertheless been shown in previous research to correspond with procrastination in mixed findings with undergraduates with respect to age effects (e.g., younger students are more likely to procrastinate; Kim & Seo, 2015; Ponnet et al., 2015; Prohaska et al., 2000; Steel, 2007; van Eerde, 2003; older students are more likely to procrastinate: Beswick et al., 1988; Cao, 2012; Rabin et al., 2011) and gender effects (e.g., females more likely to procrastinate than males: Deemer et al., 2014; males more likely to procrastinate than females: Özer et al., 2009; Ponnet et al., 2015). Based on this preceding research, all cross-lagged models reported below were re-assessed including age and gender as covariates. As the results remained highly consistent with our final analyses below with the addition(s) of these covariates either independently or in combination, neither age nor gender were retained as covariates (see Appendix A for fit indices and figures).

Procrastination task frequencies (PASS measure). Frequencies of procrastination on specific academic tasks were assessed in graduate students by examining students' self-report responses to the PASS scale items. Results showed high frequencies of graduate students who *nearly always* or *always* procrastinated when writing term papers (62%), studying for exams (45.6%), and completing weekly readings (60.0%). Although large proportions of graduate students indicated that they procrastinated on academic tasks, smaller frequencies reported that procrastination was a problem for them when writing term papers (35.3 %), studying for exams (24%), and doing weekly readings (33.1%). Lastly, 66.4% of students indicated wanting to

reduce their procrastination behaviours when writing papers, 49.5% with respect to preparing for their examinations, and 61.2% on keeping up with their weekly readings.

Correlations. Zero-order correlations between all self-report study variables (Table 3 for Time 1, Appendix B for Times 2 and 3) showed academic procrastination to be significantly positively related to anger, anxiety, shame, hopelessness, boredom, and guilt. On the contrary, academic procrastination was negatively related to enjoyment, hope, and pride. Further examination of the hypothesized valence of relations between procrastination and emotions can be found in the section entitled *Main Analyses* below in which valences of cross-paths in the structural models are discussed. Concerning the correlations between the positive emotions, enjoyment was positively related to hope ($r(680) = .66, p < .001$) and pride ($r(666) = .69, p < .001$) as was expected. With respect to correlations between negative emotions, guilt was moderately correlated with shame ($r(642) = .59, p < .001$) with the strongest correlations observed between anxiety and shame ($r(685) = .74, p < .001$) and anxiety and hopelessness ($r(685) = .77, p < .001$). Also, positive emotions were all negatively related to negative emotions (e.g., enjoyment and anger, $r(678) = -.32, p < .001$; hope and anxiety, $r(685) = -.48, p < .001$).

Psychometric Assessment

To examine the fundamental structure of the questionnaires in the present study (i.e., reliability/consistency of the scales), internal reliability was assessed using Cronbach's alpha, and the unidimensionality as well as parsimony of the psychometric measures was evaluated using Exploratory Factor Analysis (EFA).

Reliability. Reliability is the calculation of the consistency between items of a self-report measure (Hair et al., 2010). All of the study variables were found to be internally reliable based on the Cronbach's α coefficients (e.g., APSI, 13 items; α = .88, see Table 2). All internal

Table 3

Zero-order Correlations Among Study Variables at Time 1 for Graduate Students

	1	2	3	4	5	6	7	8	9
1. Procrastination	---								
2. Enjoyment	-.30**	---							
3. Hope	-.43**	.66**	---						
4. Pride	-.28**	.69**	.66**	---					
5. Anger	.41**	-.32**	-.37**	-.19**	---				
6. Anxiety	.49**	-.16**	-.48**	-.24**	.54**	---			
7. Shame	.46**	-.16**	-.49**	-.29**	.44**	.74**	---		
8. Hopelessness	.53**	-.31**	-.60**	-.42**	.54**	.77**	.79**	---	
9. Boredom	.39**	-.39**	-.27**	-.18**	.64**	.25**	.23**	.34**	---
10. Guilt	.46**	-.13**	-.35**	-.23**	.33**	.57**	.59**	.61**	.15**

Note. *p < .05, **p < .01.

reliability coefficients were above .80 at each time point, and remained relatively stable with slight elevations over time (e.g., APSI: Time 1 α = .88; Time 2 α = .88; Time 3 α = .91). Furthermore, all scales demonstrated good test-retest reliability (average interclass correlation coefficients for agreement >.84).

Factor analyses. As the main cross-lagged models evaluated below included a substantial number of estimated parameters, parceling was used to reduce the number of parameters to be estimated for each model (comparable to other studies done in educational psychology; e.g., Hall, Sampasivam, Muis, & Ranellucci, 2016). Exploratory factor analyses were conducted to determine the factor structure of the measured scales and determine if multiple sub-factors would emerge and serve as parcels. Multiple factor analyses were conducted using *varimax orthogonal rotation* methods on the academic procrastination and emotion variables. According to Hair et al. (2010), different sample sizes lead to different interpretations of the statistical significance for a factor loading, with at least 350 respondents required for a factor loading of .30 to warrant significance. No item loadings were lower than .38 in the present study.[3] Results for the procrastination measure (APSI; 13 items, Eigenvalues = 5.4, 1.1) revealed two factors, accounting for 42% and 8% of the common variance, respectively. Although the criterion for accepting a factor was based on Eigenvalues above 1, visual inspections of Scree Plots revealed only one factor (cf. prior research demonstrating a single factor by Schouwenburg, 1992). In addition, the second factor only accounted for 8% of the common variance, therefore a single omnibus factor was retained for the academic procrastination scale and preliminary results were not used to inform parcel creation.

For the academic emotion measures, results similarly revealed single-factor solutions for hope (6 items, 55% of the common variance, Eigenvalue = 3.3), anger (9 items, 53% of the

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[3] No loadings were below .30 once the 1-factor solutions were accepted based on the Scree Plots.

common variance, Eigenvalue = 4.7), anxiety (11 items, 47% of the common variance,

Eigenvalue = 5.1), boredom (11 items, 54% of the common variance, Eigenvalue = 6.0), and

guilt (6 items, 62% of the common variance, Eigenvalue = 3.8). Two-factor solutions were found

for enjoyment (10 items, accounting for 40% and 13% of the common variance, respectively;

Eigenvalues = 4.0, 1.1), pride (6 items, accounting for 50% and 20% of the common variance,

respectively; Eigenvalues = 3.0, 1.2), shame (11 items, accounting for 53% and 10% of the

common variance, respectively; Eigenvalues = 5.9, 1.1), and hopelessness (11 items, accounting

for 59% and 9% of the common variance, respectively; Eigenvalues = 6.5, 1.0). However,

following visual inspections of the Scree Plots, and given the minimal additional variance

accounted for by the second factors as well as prior research demonstrating a single factor (AEQ,

Pekrun et al. 2002; PFQ-2, Harder & Lewis, 1987), only one factor was retained for each scale.

As such, whereas a substantial total number of items were assessed resulting in between six and

13 indicators for each latent construct, exploratory factor analyses did not provide empirical

evidence to inform how parcels should be created. Accordingly, it was decided to parcel scale

items into a small number of indicators (in various ways, see section below on *Parcels: Best*

practices) so as to reduce the number of parameters estimated in each of the main cross-lagged

models outlined below.

Parcels: Conceptual rationales. Parceling is frequently used in multivariate analyses

involving a latent-variable approach where several items (i.e., indicators) are used to measure a

given theoretical construct (i.e., Little, Cunningham, Shahar, & Widaman, 2002). In parceling,

scale items are combined together to create fewer item groups (e.g., Item 1 + Item 2 = Group 1,

Item 3 + Item 4 = Group 2), with these new "groups" referred to as "parcels" that are comprised

of 2 or more items (Little et al., 2002). More specifically, 2 or more items are grouped together

to form a new composite variable, with these variables then used as indicators for latent

constructs in a structural equation model in place of the original individual items.

Historically, parceling has been regarded as a controversial technique; with critics of

parceling claiming that parcels create a "smoke-and-mirrors" misrepresentation of reality and

should be avoided to minimize researcher bias in parcel creation (Little, 2013). In other words,

researchers argue that such aggregate scores are not a true representation of reality and therefore

should be avoided (similar to an empiricist-conservative philosophy of science). Advocates of

parceling, on the other hand, disagree and recommend parceling as a means of clarifying

otherwise ambiguous or unwieldy research protocols (similar to a pragmatic-liberal philosophy

of science; Little et al., 2002). As outlined below, the various advantages to parceling items tend

to fall into two groups: psychometric and model-based (Little, 2013; Little et al., 2002, Little,

Rhemtulla, Gibson, & Schoemann, 2013; Matsunaga, 2008).

From a psychometric perspective, the fundamental assumptions of classical test theory

assert that there are an infinite number of possible items (indicators) that can be selected to

measure a given construct, each of which have some quantity of association to the constructs'

true centroid (i.e., the "essence" of the variable; Little et al., 2002, 2013). Any given item (e.g.,

an item measuring anxiety, x) contains multiple sources of variance, including a true component

(t; "true" variance associated with the construct of interest; e.g., variance that pertains to anxiety

when the desired variable of interest is anxiety), a specific component (s; independent variance

unrelated to the construct of interest; e.g., variance that pertains to a related construct like

depression), and the measured error (e; variance that is unrelated to both the true component and

the specific component; e.g., noise). In addition, variables fluctuate according to their operational

specificity (Little et al., 2002, 2013).

Under the presupposition that all items in a given scale measure the same construct, the true component (i.e., common variance, *t*) of each item should remain constant across items, whereas the specific component and the measured error should vary from one item to another in a random fashion (i.e., unique variance, *s, e*; Matsunaga, 2008). By aggregating the items, the true variance (*t*, common variance) should remain the same across items. Since the specific component (*s*, unique variance) and measured error (*e*, unique variance) of each item are uncorrelated across the items in a scale, adding these items together (aggregating them) should result in all *s* components cancelling out other *s* components, and all *e* components cancelling out other *e* components. In other words, parceling should reduce the specific (*s*) and unreliable variance (*e*), leaving more of the true variance (e.g., true variance associated with anxiety, *t*), resulting in higher reliability, higher communality, more true-score variance, and a higher ratio between the common-to-unique factor variance (Little, 2013; Little et al., 2013).

With respect to additional psychometric arguments in favor of parceling, aggregate scores are also able to approach a normal distribution more closely than original scale items, due to single items capturing only a glimpse of the overall construct relative to parcels that are more encompassing and less likely to exhibit normality issues (e.g., skew and kurtosis). Parceling has further been argued to increase a statistical model's ability to define the construct ("model efficiency"; Matsunaga, 2008) such that the likelihood of capturing the true construct of interest is higher relative to single scale items since in addition to the true component (*t*), the specific component (*s*) and the random error (*e*) are also present. In other words, although increasing the number of items used in an analysis increases unique, unwanted error, aggregating multiple items together is nevertheless argued to combine common elements among the items, revealing more of the true underlying construct, without increasing unique error (Matsunaga, 2008).

Parceling thus allows for fewer indicators (reducing the error) and the inclusion of more information in the resulting model (more items overall, aggregated into parcels), resulting in greater model efficiency.

The benefits of parceling have also been argued with respect to specific modeling. First, estimation stability is compromised when using item-level data, since item-level data incorporates large amounts of measurement error, leading to estimation instability (Matsunaga, 2008). More specifically, small changes to a given model can alter the estimated parameters when using an item-based model, resulting in compromised generalizability of findings. One method to increase stability is to either increase sample size (N) or reduce model complexity, with these two sources of estimation instability potentially remedied by parceling that requires fewer indicators per latent construct resulting in fewer parameter estimates and an optimized sample size to parameter ratio. Lastly, parceling has been found to lead to better goodness-of-fit indices, with item-based studies having been repeatedly shown to report poorer goodness-of-fit indices than studies using parcels (Little et al., 2012).

Alongside the benefits associated with parceling, two main disadvantages are consistently cited (Marsh, Lüdtke, Nagengast, Morin, & Von Davier, 2008). As noted by Matsunaga (2008), study findings are mixed as to whether or not parceling increases estimation bias in simulation studies by way of decreasing effect size estimates. Well-conditioned data (e.g., normal data with no correlated errors) does not appear to benefit from the use of parceling due to a lack of space for improvements, whereas studies that do not include well-conditioned data have been found to benefit from the reduced error (Matsunaga, 2008). Nevertheless, critics further note that the dimensionality of a scale must be understood if one opts to use parcels, with authors suggesting that parceling may be acceptable when scale items are unidimensional in nature (Little et al.,

2013) as the dimensionality of the factors may become distorted (leading to misrepresentations) when parcels are used with multidimensional scales due to potential masking multiple measurement issues (i.e., cross-loading factors, or correlated errors) that are present at the item level.

Taken together, parceling was considered an appropriate method for indicator reduction for the present data set. With respect to the cons of analyzing parceled data, given that the present data was not perfectly normally distributed, effect size estimates may be marginally inflated from the use of parcels. However, the pros of parceling were decided to outweigh the cons such that aggregating items together allowed for fewer indicators (reducing the error), including more information in the resulting model (i.e., model efficiency), higher reliability, higher communality, more true-score variance, a higher ratio between the common-to-unique factor variance, as well as optimized sample size to parameter ratios and better goodness of fit indices (Little, 2013). Morever, as the dimensionality of each scale was further assessed using EFAs showing all variables to be unidimensional in nature, the possibility of hidden measurement issues when creating parcels was considered minimal.

Parcels: Best practices. Concerning best practices with respect to the specific ways in which parcels can be created, forming fewer parcels should yield better model fit and more optimal goodness-of-fit indices. Bandolos (2002) found that all-item-parceling (similar to a total score) and three-parcel models showed better goodness-of-fit when compared to six-parcel models. The fewer the parcels, the lower the proportion of error represented, therefore the greater the true variance and model fit. Moreover, it is recommended to use averages of items instead of total scores to ensure that differences in the number of items used in each parcel does not affect the results, making the parcels more comparable (Little, 2013).

There are many different methods used to create parcels including random parceling, factorial parceling, correlational parceling, and radial parceling. *Random parceling* involves assigning items randomly to a parcel, typically in a sequential manner. For example, if you have 9 items measuring anxiety, you could create the following parcels: Items $1 + 2 + 3$ = Parcel 1; Items $4 + 5 + 6$ = Parcel 2; and Items $7 + 8 + 9$ = Parcel 3. *Factorial parceling* (also known as "item-to-construct balance"), involves first conducting a factor analysis on scale items and creating each parcel based by combining the items having the highest and lowest factor loadings. For example, if you had 12 items, the first parcel would combine the first loading item (strongest), the sixth and seventh loading items (moderate), and the twelfth loading item (weakest). Similarly, the second parcel would combine the second-highest loading item, the fifth and eighth-highest loading items, and the eleventh highest loading items, with the third parcel combining the remaining items (Matsunaga, 2008).

Another approach referred to as *correlational parceling* involves looking at the bivariate correlations and creating pairs of the items with the highest correlations (Matsunaga, 2008). A related tactic called the balancing approach creates parcels based on the average of the highest item-scale correlation and the lowest item-scale correlation (combined in pairs until all items are paired; Little, 2013). Finally, *radial parceling* represents a combination of correlational and factorial parceling in which factor loadings are used to create parcels thereby creating pairs of the strongest loading factors until all items are placed into parcels. It is important to note that as many approaches to parceling rely on combining pairs of items into parcels, scales with more than six items must necessarily require more than three parcels thus violating other best practices suggesting that creating more than three parcels is not ideal (Matsunaga, 2008).

Parcels: Study findings. Given the above considerations with respect to parceling rationale and best practices, the present study utilized parceling as a method of aggregating items within the unidimensional procrastination and emotion scales (as determined by the EFAs), therefore reducing the number of parameters required to be estimated in each cross-lagged model. More specifically, the present study explored the potential differences between three different methods of parceling in a subset of the main cross-lagged models with graduate students (due to notably larger magnitude of the graduate vs. undergraduate student sample) comparing academic procrastination and enjoyment (positive, activating emotion), anxiety (negative, activating emotion), and boredom (negative, deactivating emotion).

Random parceling, the most common method of parceling, was tested in which items were combined sequentially to create three parcels (three or four items aggregated within each parcel) or combined into pairs of items resulting in six or seven parcels for each variable (two items aggregated within each parcel). Furthermore, similar to other longitudinal studies (Vogel, Bitman, Hammer, & Wade, 2013; Wortman, Lucas, & Donnellan, 2012), the *factorial approach* was also tested by conducting multiple factor analyses (one for each variable at each time point), finding the average ranking of factor loadings from largest to smallest magnitude across the three time points, and creating three parcels that each included items having the strongest, moderate, and lowest loadings (e.g., 12-item scale, Item 1 [highest average loading across three time points] + Items 6 + 7 [moderate average loadings] + Item 12 [lowest average loading] = Parcel 1; Item 2 [next highest average loading] + Items 5 + 8 [moderate average loadings] + Item 11 [second lowest average loading] = Parcel 2; Item 3 [third highest average loading] + Items 4 + 9 [remaining moderate average loadings] + Item 10 [third lowest loading across three time points] = Parcel 3).

As expected, results showed the smaller random parcel model (three parcels comprised of 3-4 items each) to consistently outperform the random pairs of parcels model (6-7 parcels comprised of two items each) with respect to the goodness-of-fit indices for the cross-lagged models assessed including procrastination and anxiety (three parcels: CFI = .987, TLI = .980, RMSEA = .031; paired parcels: CFI = .974, TLI = .968, RMSEA = .026), enjoyment (three parcels: CFI = .984, TLI = .974, RMSEA = .032; paired parcels: CFI = .963, TLI = .954, RMSEA = .030), and boredom (three parcels: CFI = .979, TLI = .967, RMSEA = .040; paired parcels: CFI = .955, TLI = .942, RMSEA = .038). Comparisons also showed the *fit indices* for the random three-parcel model and the factorial three-parcel model to be roughly equivalent for cross-lagged analyses contrasting procrastination with anxiety (random approach: CFI = .987, TLI = .980, RMSEA = .031; factorial approach: CFI = .986, TLI = .978, RMSEA = .033), enjoyment (random approach: CFI = .984, TLI = .974, RMSEA = .032; factorial approach: CFI = .981, TLI = .969, RMSEA = .036), and boredom (random approach: CFI = .979, TLI = .967, RMSEA = .040; factorial approach: CFI = .986, TLI = .977, RMSEA = .034). Moreover, the magnitudes of both the autoregressive and cross-lagged paths were found to be nearly equivalent between the random and factorial three-parcel models (e.g., cross-lagged model assessing procrastination and enjoyment, random approach: cross-lagged βs = |.10-.11|, autoregressive βs = .74-.82; factorial approach: cross-lagged βs = |.09-.12|, autoregressive βs = .66-.84).

Given these preliminary findings showing the three-parcel structure to be ideal, and equivalent findings between the standard random parceling and more intensive factorial parceling methods, the three-parcel method utilizing the random approach was adopted for all subsequent main analyses (Figure 5) due to it representing the most efficient and parsimonious
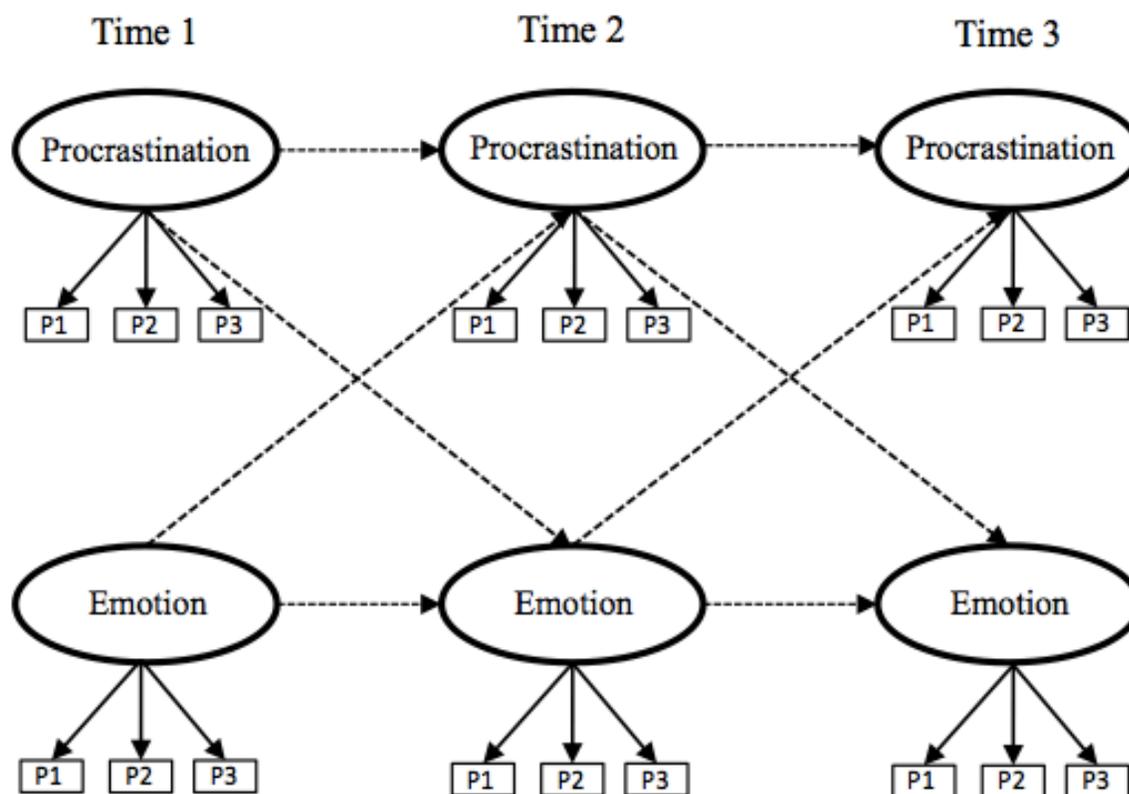
Figure 5. Visual representation of smaller random parceling model (3 parcels per variable).[4]

parceling method. Correlations between all variable parcels for both graduate and undergraduate student samples are outlined in Appendix C.

Main Analyses

Rationale for SEM analyses. Structural equation modeling (SEM) is a family of statistical techniques that investigates the relationships and structures between various variables (Hair et al., 2010; McCoach, 2003). More specifically, a latent construct (unobservable variable) is measured indirectly through consideration of the consistency with multiple measured variables (also known as indicators or manifest variables; Hair et al., 2010) and covariance matrices between sets of variables are used to understand the interrelationship between them (McCoach,

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[4] Each model examined a different emotion in relation to academic procrastination.

2013). As the variables in the present study (e.g., procrastination and emotions) are not directly

observable, and structural equation modelling was readily afforded by the present sample sizes,

latent variable modeling was used to examine hypothesized relations between these variables.

The present study aimed to examine the cross-lagged effects of academic procrastination and

several emotions across three different time points. Multiple structural equation models were

examined, with each including academic procrastination (Times 1-3) and a given emotion

(Times 1-3) resulting in nine cross-lagged models evaluated using AMOS (Version 22;

Arbuckle, 2013). Raw Maximum Likelihood Methods (also known as Full Information

Maximum Likelihood; FIML) was employed such that available data were used to estimate the

means and intercepts. Accordingly, the present study analyses are directly comparable to those of

other studies in educational psychology in which cross-lagged relations between motivation and

emotion constructs have been investigated (e.g., boredom and achievement in students, Pekrun,

Hall, Goetz, & Perry, 2014; teachers' goals and emotions, Wang, Hall, Goetz, & Frenzel, 2016).

To examine the goodness-of-fit of the model, absolute and incremental fit indices were

examined. The chi-square statistic (x^2) is an absolute fit index that examines how well a theory

fits the data (i.e., how well the estimated model fits the observed model), and is very sensitive to

sample size (Schermelleh-Engel, Moosbrugger, & Müller, 2003). Accordingly, additional fit

indices including Root Mean Square Error of Approximation (RMSEA; ideal range for our

sample size: <.08 when CFI is >/=.92), the Tucker Lewis Index (TLI), and the Comparative Fit

Index, (CFI; ideal range for our sample size: >/= .92) were used (Hair et al., 2010). Nine sets of

cross-lagged structural equation models were conducted to assess associations between academic

procrastination and emotions (enjoyment, hope, pride, anger, anxiety, shame, hopelessness,

boredom, and guilt) across three time points (see Figures 1, 2, 3, 4, and 5 for visual

representations). Each emotion variable was evaluated separately in relation to procrastination to reduce the number of parameters to be estimated in each model (optimize model parsimony), as well as minimize potential multicollinearity between the emotion variables, given that some emotions are highly correlated with one another (e.g., shame and anxiety, $r = .74$).

Autoregressive paths between the same latent variable (e.g., academic procrastination from Time 1 → Time 2, and Time 2 → Time 3) were included to assess construct stability. In addition, the error terms were correlated between all parallel manifest parcel variables to control for persistent response bias (e.g., the error term of parcel 1 for procrastination at Time 1 was correlated with both the error term for parcel 1 for procrastination at Time 2, and the error term for parcel 1 for procrastination at Time 3). The decision to correlate error terms follows from recent discussions in the quantitative methods literature suggesting that the information in the error terms has two sources of variability, the unique (s) component, and the random (e) component. When an item is presented multiple times within one model, the unique component is expected to co-vary from one time point to the next, therefore all error terms were correlated with each other (Little, Preacher, Selig, & Card, 2007). Cross-paths from procrastination at Time X to a given emotion at Time X+1 were also modelled to examine the potential influence of one construct on the other accounting for autoregressive paths. Covariances between the latent variables assessed at the same time point were also modelled (e.g., Time 1 Procrastination <--> Time 1 Anxiety). The autoregressive paths were strong for all models assessed, with the strongest path found for Shame$_{T2}$ → Shame$_{T3}$ ($\beta = .92$, $p < .001$)

Factorial invariance was also assessed using a longitudinal confirmatory factor analysis approach in which equality constraints were placed on the parameters of each model (i.e., investigating a model in which the pattern of the factor loadings equate over time vs. a model in

which the factor loadings are constrained to be equal over time; Little, 2013). Factorial invariance was supported for all models with a loss in fit ΔCFI < -.010, demonstrating that all models showed measurement equivalence over time (Cheung & Rensvold, 2001). Given that invariance was found, the models in which the factor loadings were constrained to equate over time were used as baselines for the cross-lagged analyses reported below.

Main SEM results: Positive emotions. All cross-lagged structural equation models had adequate fit based on the above-mentioned criteria. Significant results were found for enjoyment, hope, and pride. More specifically, a lack of enjoyment at Time 1 predicted procrastination at Time 2, which negatively predicted subsequent enjoyment at Time 3 (χ^2 = 200.765, df = 114, p < .001, CFI = .984, TLI = .976, RMSEA = .030, 90% CI = .023-.037; Figure 6). Hope at Time 1 significantly negatively predicted procrastination at Time 2, and hope at Time 2 significantly negatively predicted procrastination at Time 3 (χ^2 = 192.524, df = 114, p < .001, CFI = .987, TLI = .980, RMSEA = .029, 90% CI = .022-.036; Figure 7). Pride at Time 2 also significantly negatively predicted procrastination at Time 3 (χ^2 = 225.725, df = 114, p < .001, CFI = .980, TLI = .970, RMSEA = .035, 90% CI = .028-.041; Figure 8).

Main SEM results: Negative emotions. All cross-lagged structural equation models had adequate fit based on the above-mentioned criteria. Significant results were found for shame, hopelessness, boredom, anger, anxiety, and guilt. More specifically, shame at Time 2 positively predicted procrastination at Time 3 (χ^2 = 182.899, df = 114, p < .001, CFI = .991, TLI = .986, RMSEA = .027, 90% CI = .020-.034; Figure 9). Hopelessness at Time 2 also significantly positively predicted procrastination at Time 3 (χ^2 = 249.573, df = 114, p < .001, CFI = .982, TLI = .973, RMSEA = .038, 90% CI = .032-.044; Figure 10). Procrastination at Time 1 was also found to positively influence successive anger and boredom at Time 2 (anger model: χ^2 =

278.080, $df = 114$, $p < .001$, CFI = .974, TLI = .961, RMSEA = .042, 90% CI = .036-.048;

Figure 11; boredom model: $\chi^2 = 246.776$, $df = 114$, $p < .001$, CFI = .981, TLI = .971, RMSEA =

.038, 90% CI = .031-.044; Figure 12). Procrastination at Time 1 negatively predicted subsequent

anxiety and guilt at Time 2 that, in turn, negatively predicted procrastination at Time 3 (anxiety

model: $\chi^2 = 197.979$, $df = 114$, $p < .001$, CFI = .987, TLI = .981, RMSEA = .030, 90% CI = .023-

.037; Figure 13; guilt model: $\chi^2 = 181.020$, $df = 114$, $p < .001$, CFI = .989, TLI = .984, RMSEA =

.027, 90% CI = .019-.034; Figure 14).

Summary of Study 1 Findings

Overall, results showed graduate students to report high levels of procrastination across

academic tasks. More specifically, of the three academic tasks (writing term papers, studying for

exams, and keeping up with weekly readings), graduate students indicated that they

procrastinated most when writing term papers and keeping up with weekly readings (Hypothesis

1a). In addition, graduate students reported that procrastination was problematic for themselves

and that they wished to reduce their procrastination when writing term papers and keeping up

with their weekly readings (Hypothesis 1b and 1c, respectively). Hypothesis 2 was also

supported, with zero-order correlations showing academic procrastination to be negatively

related to more adaptive/positive emotions (i.e., enjoyment and hope; Hypothesis 2a) and

positively related to more maladaptive/negative emotions (i.e., anxiety and guilt; Hypothesis 2b).

Furthermore, Hypothesis 3 was supported by cross-lagged findings revealing bidirectional

patterns of effects between academic procrastination and emotions. Hope, pride, shame, and

hopelessness predicted subsequent academic procrastination (Hypothesis 3a), whereas academic

procrastination predicted higher levels of subsequent anger and boredom (Hypothesis 3b).

Sequential relationships between academic procrastination and emotions were also found for
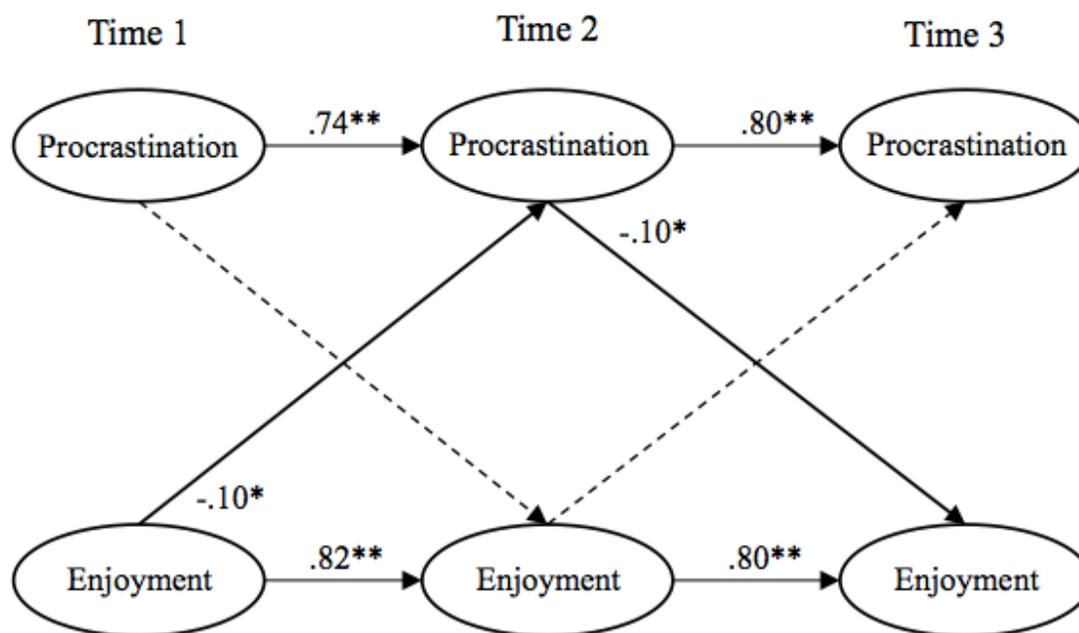
Figure 6. Cross-lagged results for procrastination and enjoyment (graduate students).
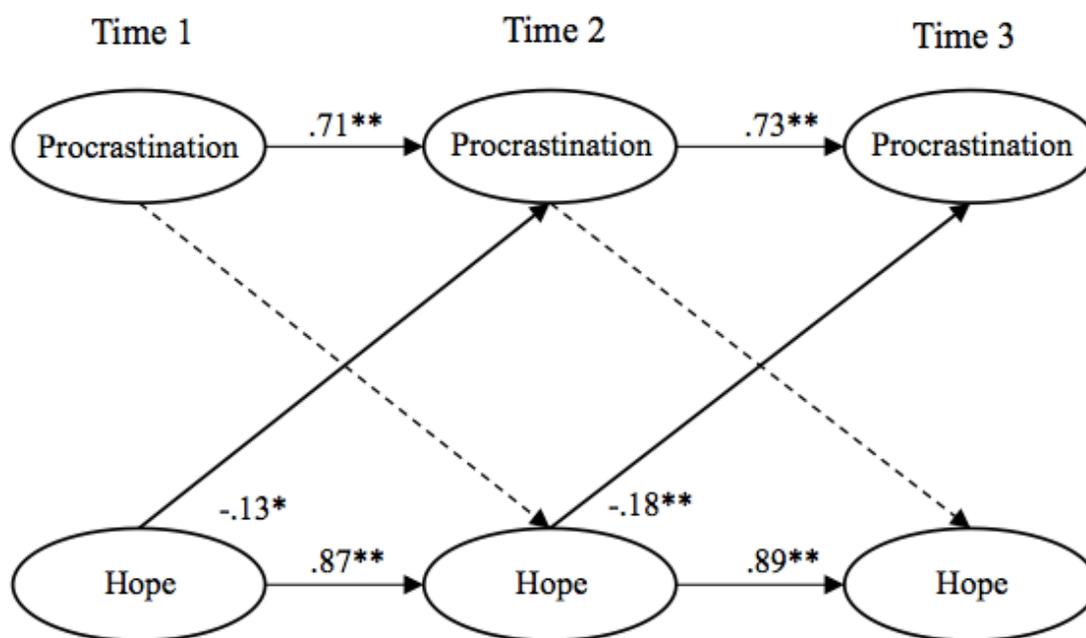
p < .05, **p* <.001.

Figure 7. Cross-lagged results for procrastination and hope (graduate students).
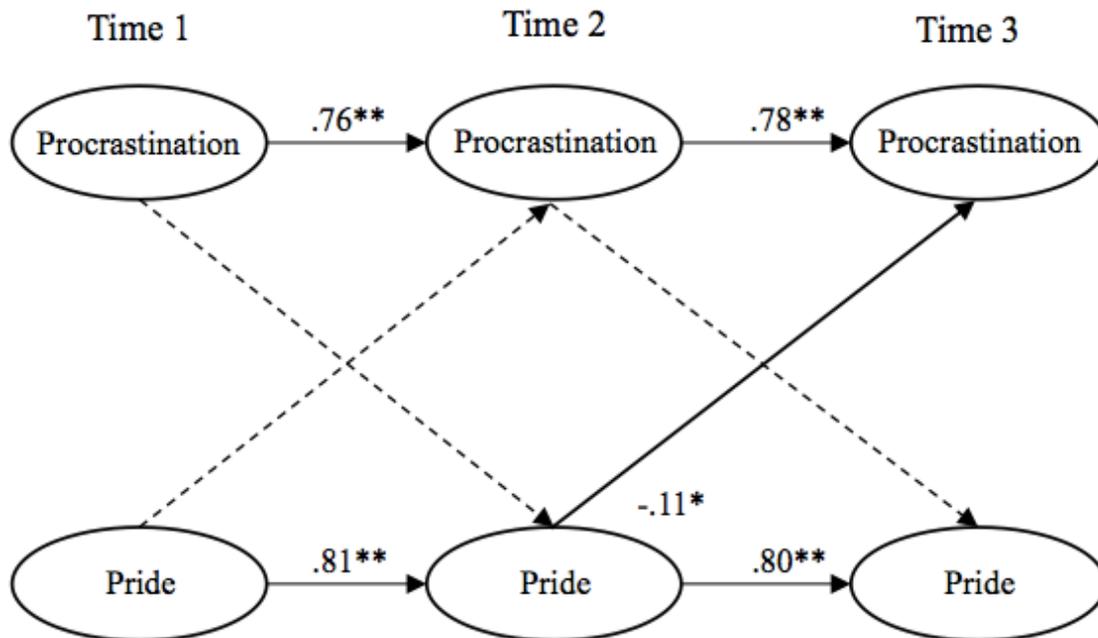
p < .05, **p* <.001.

Figure 8. Cross-lagged results for procrastination and pride (graduate students).
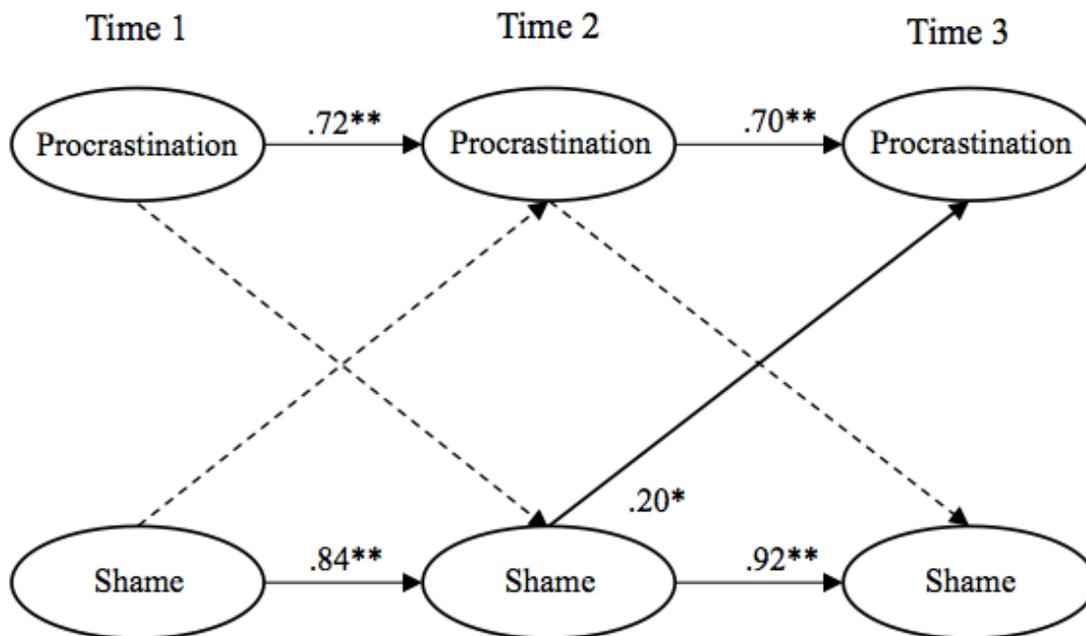
p < .05, **p* <.001.

Figure 9. Cross-lagged results for procrastination and shame (graduate students).
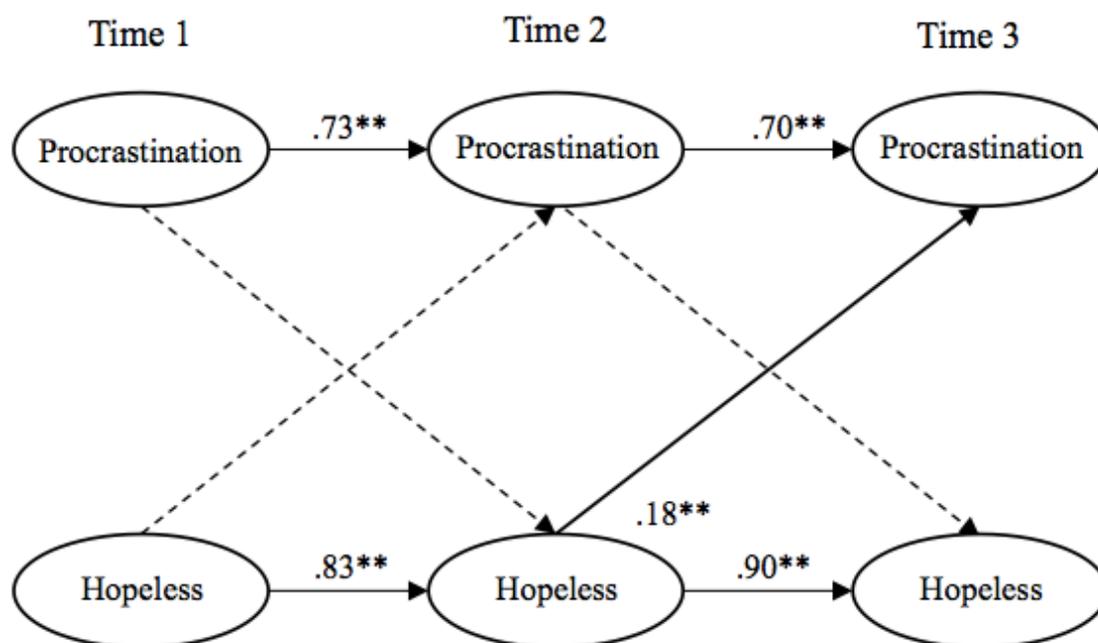
p < .05, **p* <.001.

Figure 10. Cross-lagged results for procrastination and hopelessness (graduate students).
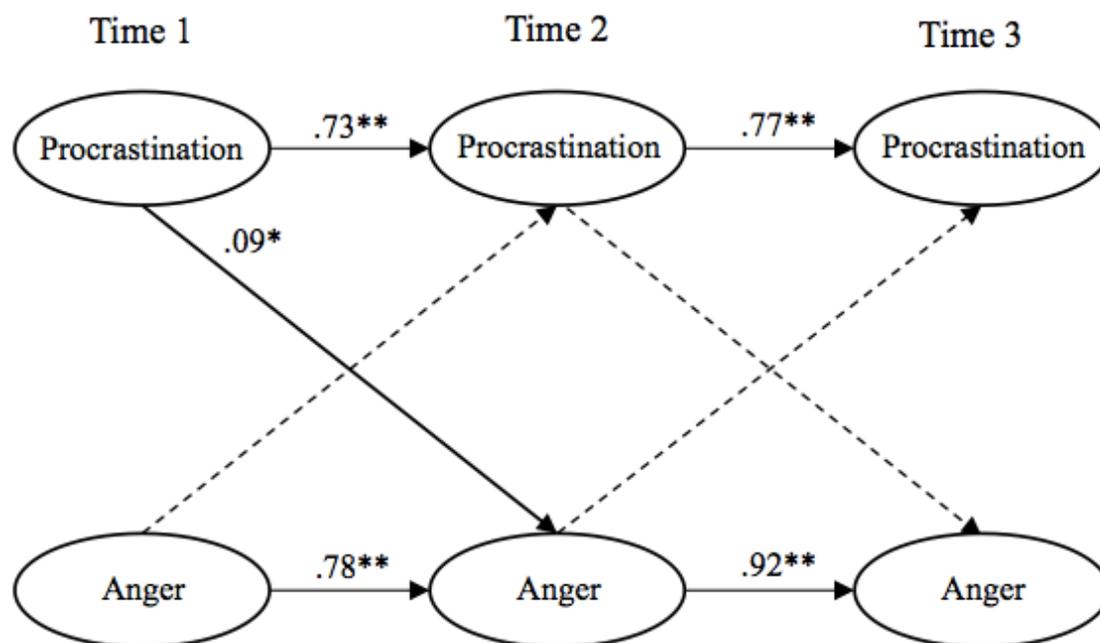
p < .05, **p* <.001.

Figure 11. Cross-lagged results for procrastination and anger (graduate students).
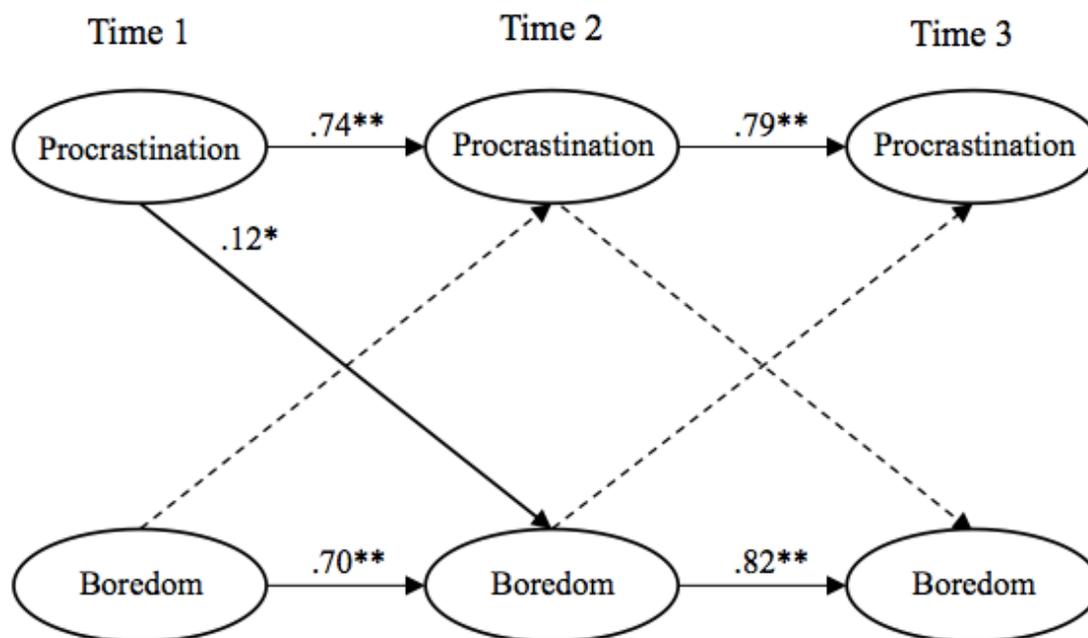
p < .05, **p* <.001.

Figure 12. Cross-lagged results for procrastination and boredom (graduate students).
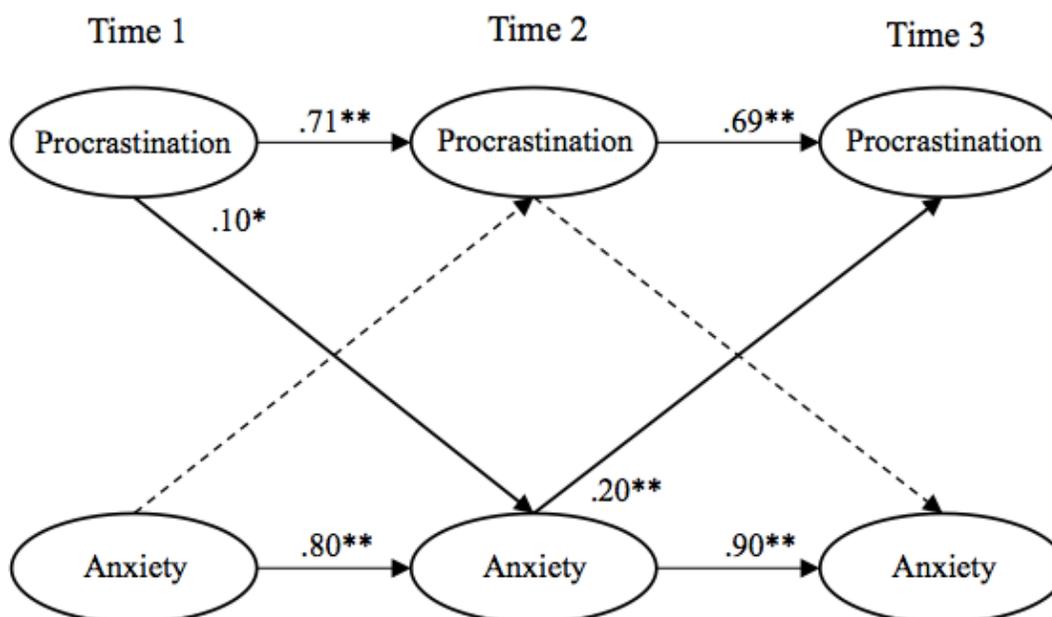
p < .05, **p* <.001.

Figure 13. Cross-lagged results for procrastination and anxiety (graduate students).
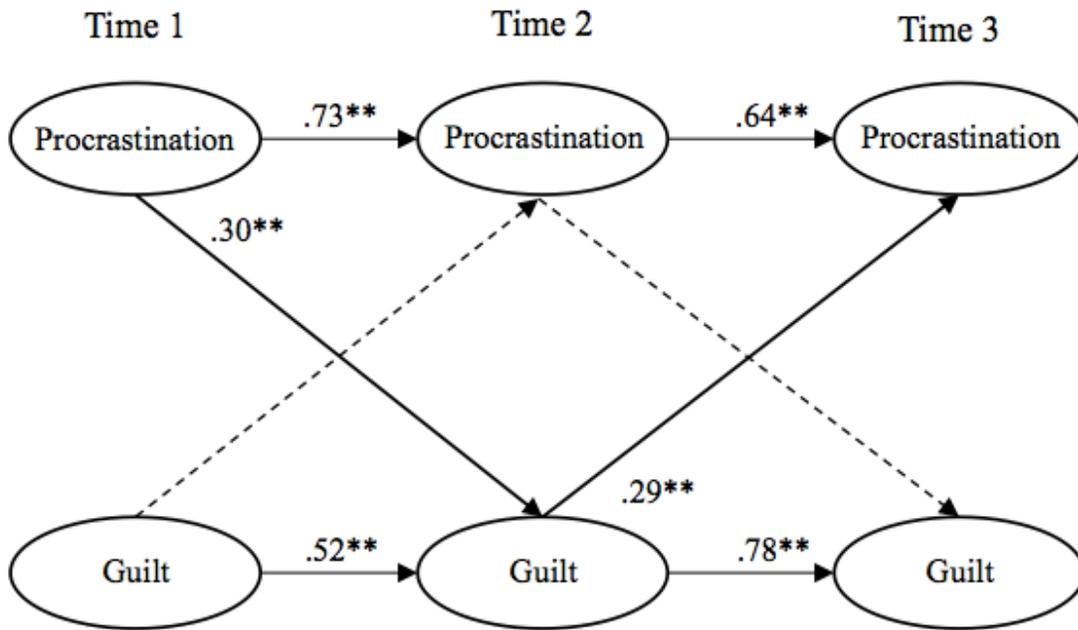
p < .05, **p* <.001.

Figure 14. Cross-lagged results for procrastination and guilt (graduate students).

p < .05, **p* <.001.

enjoyment, anxiety, and guilt (Hypothesis 3d), such that a lack of enjoyment predicted greater

academic procrastination that, in turn, predicted lower subsequent enjoyment, whereas academic

procrastination predicted greater subsequent anxiety and guilt that, in turn, predicted greater

academic procrastination.

Study 2: Undergraduate Students

Participants

The sample consisted of 359 undergraduate students who were recruited from 54 countries,

and most of the participants were enrolled full-time (92%) from Canadian (17.3%) or American

(35.5%) institutions. The sample included 263 females (73.5%), 83 males (22.9%), and 12 non-

binary and/or other individuals (3.4%), with 65% of the students stating that English was their

first language, and 15% identifying as an international student. Undergraduate participants

reported being single (61%) or in a serious relationship (31%), and 5% stated that they had

children. In addition, ages ranged from 17 years old – 36 years old (M_{age} = 21.91), with most

participants holding a high school degree (69%), or a bachelor's degree (28%), and most students

were either fourth (30%), third (24%), or second year (20%) undergraduate students. Also,

family incomes were composed as follows: <$20,000 (18%), $20,000 - $40,000 (13.8%),

$40,000 – $60,000 (12.1%), $60,000 – $80,000 (9.6%), >$80,000 (19.8%), and 26.6% chose not

to answer.

Results

Data Screening

In accordance with Tabachnick and Fidell (2007), numerous steps were taken to ensure

that the data were clean and that the underlying assumptions of parametric testing were met prior

to conducting analyses with respect to data accuracy, missing data, participant attrition, outliers,

normality, homoscedasticity, and linearity.

Data accuracy. The accuracy of the data were validated by checking the data entered in

SPSS against the original items and the univariate descriptive statistics were assessed using the

frequencies function in SPSS to ensure that the data were within intended ranges (please see

Table 4 for summary of the descriptive statistics or the undergraduate students, including

Cronbach's alpha, means, standard deviations, numbers of participants, numbers of items, and

actual ranges).

Missing data. Given that the participants were not required to answer all study questions

(as part of the procedures outlined in our ethics), some variables contained missing data. Similar

to the graduate student sample, the missing data were due mainly to attrition, as confirmed by the

increased frequencies of missing cases as students progressed through the study (8% of the data were missing for variables present in the first half of the survey, whereas the missing values increased to 21% for the last half of the questionnaire). An independent samples *t*-test was conducted comparing participants with complete versus incomplete data on the APSI procrastination variable (i.e., a dummy coded variable was created to compare students who completed past the second half of the survey vs. those who stopped before the half-way point). Results revealed no significant differences between these two groups on academic procrastination, therefore no missing data imputations were considered. In addition, AMOS (Version 22) is equipped to estimate means and intercepts with Full Information Maximum Likelihood (FIML) that uses available cases to compute maximum likelihood estimates of missing cases.

Participant attrition. The present study was longitudinal, therefore attrition between each time point was expected. For the undergraduate sample, 359 participants completed Time 1, whereas only 186 participants completed Time 2 (48% attrition), and 106 participants completed Time 3 (40% attrition). Multiple one-way ANOVAs revealed a significant finding between attrition and academic procrastination (Phase 1 only: $n = 140$, $M = 3.25$ vs. all study phases: $n = 105$, $M = 3.03$, $p = .040$, $\eta_p^2 = 0.02$), enjoyment (Phase 1 only: $n = 118$, $M = 3.20$ vs. Phases 1 and 2 only: $n = 65$, $M = 3.52$, $p = .026$, $\eta_p^2 = 0.03$), and boredom (Phase 1 only: $n = 140$, $M = 2.78$ vs. all study phases: $n = 100$, $M = 2.39$, $p = .013$, $\eta_p^2 = 0.03$). These results demonstrate that students who completed only Phase 1 reported higher levels of procrastination and boredom than students who completed the entire study, with students who completed more study phases also reporting higher enjoyment levels. However, interpretation of ANOVA results should be made with caution due to effect sizes being weak in magnitude (Richardson, 2011). In addition,

Table 4

Psychometric Properties of Study Variables (Undergraduate Students)

	n			M			SD			α				Actual range		
Variable	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	Items	T1	T2	T3
Procrastination																
Academic	318	163	102	3.17	3.19	3.24	0.67	0.68	0.75	.88	.87	.90	13	1.40 – 5.00	1.60 - 4.80	1.70 - 4.80
Emotions																
Enjoyment	283	156	98	3.35	3.29	3.24	0.79	0.71	0.80	.86	.83	.87	10	1.00 - 5.00	1.50 - 5.00	1.00 - 4.90
Hope	283	156	98	3.14	3.15	3.12	0.86	0.78	0.89	.82	.82	.89	6	1.00 - 5.00	1.17 - 5.00	1.17 - 5.00
Pride	277	155	98	3.40	3.41	3.37	0.87	0.83	0.84	.80	.79	.81	6	1.00 - 5.00	1.00 - 5.00	1.67 - 5.00
Anger	283	156	98	2.25	2.16	2.12	0.89	0.88	0.88	.87	.88	.90	9	1.00 - 5.00	1.00 - 5.00	1.00 - 4.78
Anxiety	283	156	98	3.00	2.97	2.89	0.95	0.89	1.03	.88	.89	.92	11	1.00 - 5.00	1.09 - 4.82	1.00 - 5.00
Shame	283	156	98	2.90	2.93	2.93	1.06	1.05	1.14	.90	.91	.94	11	1.00 - 5.00	1.09 - 5.00	1.00 - 5.00
Hopelessness	283	156	98	2.47	2.43	2.50	1.07	1.09	1.15	.93	.94	.96	11	1.00 - 5.00	1.00 - 4.91	1.00 - 4.82
Boredom	283	156	98	2.60	2.44	2.39	0.99	0.93	0.94	.92	.93	.94	11	1.00 - 5.00	1.09 - 4.82	1.00 - 4.82
Guilt	273	153	95	2.81	2.61	2.50	1.10	1.12	1.08	.88	.90	.90	6	1.00 - 5.00	1.00 - 5.00	1.00 - 5.00

Note. *p < .05, **p < .01.

multiple two-way $\chi 2$ analyses revealed no differences between students who had completed all study phases and students who quit prematurely on other key demographic variables (e.g., gender, relationship status).

Outliers. Outliers were analyzed for the study variables of academic procrastination, academic emotions, age, and gender.[5] When outliers were assessed using z-scores only one variable was found to violate this assumption. Using the cutoff of +/- 3.29 ($p < .001$, two-tailed test), nine cases were removed for age (standardized z-scores: 5.20, 3.82, 3.59, and 3.36; actual item values: 45, 39, 38, and 37).[6]

Normality. Normality was assessed by investigating skewness, kurtosis, and probability plots. Relying on the absolute values of skewness and kurtosis (Kim, 2013) all of the variables did not violate the assumption of normality based on the criteria of +/- 2 for skew and +/- 7 for kurtosis. Also, the probability plots showed that all of the variables were normally distributed (i.e., the points on the plots were close to the points on the diagonal line). The points on the plots did not significantly go above or below the diagonal line (meeting the assumption of kurtosis), and the points did not significantly arc above or below the diagonal line (meeting the assumption of skewness).

Homoscedasticity. Homoscedasticity examines whether or not the scores on the dependent variables have equal levels of variance across the range of scores for the independent variables (Hair et al., 2010). Visual inspection of bivariate scatterplots displaying the standardized residuals of the errors by the regression standardized predicted scores showed homoscedastic

---

[5] Outliers were conducted for total scales, but then re-done once parceling method was specified to ensure that the chosen indicators did not have extreme scores.

[6] All multivariate outliers were retained given that removal of multivariate outliers can significantly reduce sample size, and based on recent findings challenging the reliability of the Mahalanobis distance test with respect to false positives (Cousineau & Chartier, 2010; Tabachnick & Fidell, 2007).

patterns for all variables in the present data set (e.g., each endogenous variable in our main cross-lagged models presented below was assessed in conjunction with each exogenous variable: academic procrastination Time 1 by anxiety Time 2, academic procrastination Time 1 by anxiety Time 3, anxiety Time 1 by academic procrastination Time 2, anxiety Time 1 by academic procrastination Time 3, etc. for all other emotions). For each pair of variables assessed, the points on scatterplots were equally dispersed (i.e., there was no pattern in the distribution of the dots).

Linearity. To examine linearity, multiple scatterplots were produced to observe the relationships between all of the procrastination and emotions variables. Results showed an oval-shaped pattern of responses for all combinations of procrastination and emotion variables (e.g., Time 1 procrastination with Time 1 anxiety, Time 1 procrastination with Time 2 anxiety, Time 2 procrastination with Time 2 anxiety, Time 2 procrastination with Time 3 anxiety, Time 3 procrastination with Time 2 anxiety, and Time 3 procrastination with Time 3 anxiety, etc. for all other emotions).

Preliminary Analyses

Initial differences. Initial differences between demographic variables and the study measures (e.g., Time 1 academic procrastination and emotions assessments) as a function of critical demographic variables were analyzed to examine if possible confounds existed in the present data set that could be included as potential covariates. Given that a large number of comparisons were conducted, a Bonferroni correction was performed, resulting in a new significance threshold of $p < .0056$. Bivariate correlations with the main study variables were all non-significant for age, education level, year in program, and family income. Independent samples t-tests conducted to examine gender effects on our study variables showed no significant

differences on any study measure ($p > .0056$). Multiple one-way ANOVAs revealed no significant differences on any study measure as a function of relationship status. Nevertheless, due to these demographic variables having been shown in previous research to correspond with procrastination levels (e.g., age, Beswick et al., 1988; Cao, 2012; Kim & Seo, 2015; Ponnet et al., 2015; Prohaska et al., 2000; Rabin et al., 2011; Steel, 2007; van Eerde, 2003; gender, Deemer et al., 2014; Özer et al., 2009; Ponnet et al., 2015), all cross-lagged models below were re-assessed including age and gender as covariates. As the results with added covariates (either independently or in combination) remained highly consistent with our final analyses below, neither age nor gender were retained as covariates (see Appendix A for fit indices and figures).

Procrastination task frequencies (PASS measure). Frequency of procrastination was assessed in undergraduate students by examining self-report responses to the tasks-specific PASS items. Results showed the majority of undergraduate students to *nearly always* or *always* procrastinate when writing term papers (59.7%), studying for exams (58.5%), and doing weekly readings (56.1%). Smaller frequencies of students reported that procrastination was a problem for them when writing term papers (39.1%), studying for exams (41.4%), and doing weekly readings (34.4%). Lastly, 71.9% of students indicated wanting to reduce their procrastination when writing term papers, 69.1% with respect to doing their weekly readings, and 62.1% on keeping up with their weekly readings.

Correlations. Zero-order correlations between all self-report study variables (Table 5 for Time 1, Appendix D for Times 2 and 3) showed academic procrastination to be positively correlated with anger, anxiety, shame, hopelessness, boredom, and guilt, and negatively correlated with enjoyment, hope, and pride. Further examination of the valence of relations between academic procrastination and emotions can be found below in the section entitled *Main*

Analyses where the valences of the cross-paths in the structural models are discussed. In addition, enjoyment, hope, and pride were all strongly related to one another (e.g., enjoyment and hope, $r(283) = .67, p < .001$), whereas anxiety had the strongest correlation with hopelessness ($r(283) = .80, p < .001$), followed by shame ($r(283) = .75, p < .001$). Hopelessness and shame were also highly correlated with one another ($r(283) = .79, p < .001$). However, guilt was only moderately correlated with shame ($r(273) = .58, p < .001$). Also, positive emotions were all negatively related to negative emotions (e.g., enjoyment and anger, $r(283) = -.28, p < .001$; hope and anxiety, $r(283) = -.34, p < .001$).

Psychometric Assessment

As performed with the graduate student sample, the internal reliability of the questionnaires employed in the present study was examined by using Cronbach's alpha, and the unidimensionality as well as parsimony of the psychometric measures was examined using Exploratory Factor Analysis (EFA).

Reliability. Reliability is the calculation of the consistency between various measurements of a scale, and examines how interconnected the indicators are with one another (Hair et al., 2010). All study variables were found to be reliable based on the Cronbach's α coefficients presented in Table 4 (e.g., APSI, 12 items; α = .88) and remained relatively stable over time (e.g., APSI, Time 1 α = .88; Time 2 α = .87, Time 3 α = .90). Furthermore, all scales demonstrated good test-retest reliability (average correlation coefficients for agreement, >.82).

Factor analyses. As the main cross-lagged models evaluated below included a substantial number of estimated parameters, parceling was used to reduce the number of parameters to be estimated for each model. As was done with the graduate student sample, exploratory factor

Table 5

Zero-order Correlations Among Study Variables at Time 1 for Undergraduate Students

	1	2	3	4	5	6	7	8	9
1. Procrastination	--								
2. Enjoyment	-.20**	--							
3. Hope	-.31**	.67**	--						
4. Pride	-.27**	.69**	.75**	--					
5. Anger	.46**	-.28**	-.36**	-.20**	--				
6. Anxiety	.37**	.06	-.34**	-.18**	.51**	--			
7. Shame	.32**	.05	-.34**	-.22**	.39**	.75**	--		
8. Hopelessness	.45**	-.09	-.48**	-.37**	.58**	.80**	.79**	--	
9. Boredom	.47**	-.38**	-.26**	-.19**	.72**	.22**	.13*	.32**	--
10. Guilt	.39**	.04	-.24**	-.19**	.30**	.59**	.58**	.58**	.12*

Note. *p < .05, **p < .01.

analyses were conducted to determine the factor structure of the measured scales, and to see if

multiple sub-themes would emerge and serve as parcels. For the undergraduate sample, multiple

factor analyses were conducted using *varimax orthogonal rotation* methods on the academic

procrastination and emotion variables (same technique that was used for the graduate student

sample). No factor loadings were lower than .32 in the present study for any of the study

measures (N = 359, Hair et al., 2010).

Results from the rotated factor solution for the academic procrastination measure (APSI,

13 items) revealed two factors, accounting for 46% and 12% of the common variance,

respectively (Eigenvalues = 5.5, 1.1). Although the criteria for accepting a factor was an

Eigenvalue above 1, visual inspection of the Scree Plots displayed only one factor. In addition,

given that the added contribution of the variance of the second factor was minimal, and to

maintain consistency with the graduate student analyses, a single omnibus factor was evaluated

for the procrastination scale (consistent with prior research by Schouwenburg, 1995). As for the

achievement emotions questionnaire, results revealed one-factor solution each for hope (6 items,

53% of the common variance, Eigenvalue = 3.2), hopelessness (11 items, accounting for 59% of

the common variance, Eigenvalue = 6.5), boredom (11 items, 58% of the common variance,

Eigenvalue = 6.0), and guilt (6 items, 63% of the common variance, Eigenvalue = 3.8).

Lastly, two factor solutions were found for enjoyment (10 items, 44%, 11% of the common

variance; Eigenvalues = 4.4, 1.1), pride (6 items, accounting for 51% and 20% of the common

variance, respectively; Eigenvalues = 3.0, 1.1), anger (9 items, accounting for 50% and 12% of

the common variance, respectively; Eigenvalues = 4.5, 1.0), anxiety (11 items, 46%, 11% of the

common variance; Eigenvalues = 5.1, 1.2), and shame (11 items, accounting for 51% and 9% of

the common variance, respectively; Eigenvalues = 5.6, 1.0). Once again, based on visual

inspections of the Scree Plots, the observation of minimal added variance explained by the

second factors, and to remain consistent with the graduate students analyses as well as prior

research (e.g., AEQ, Pekrun, et al. 2002; PFQ-2, Harder & Lewis, 1987), only one factor was

retained for all analyses with empirical findings not informing the creation of parcels with

respect to the identification of distinct sub-factors.

Main Analyses

   Rationale for SEM analyses. As was done with the graduate sample, nine sets of cross-

lagged structural equation models were conducted using AMOS (version 22) to assess Time 1, 2,

and 3 associations between academic procrastination and emotions (achievement-related learning

emotions and guilt). All models included academic procrastination and one emotion at three

different time points (please see Figures 1, 2, 3, 4, and 5 for visual representations), with

autoregressive paths between the same latent variable and correlated error terms between all

manifest variables to control for response bias. Given the substantial total number of items

assessed (six to 13 indicators for each latent construct), parceling was once again used to

aggregate items into a small number of indicators to reduce the number of parameters estimated

in each cross-lagged model. Using the same method decided on the graduate student sample

(random smaller parcels, three parcels comprised of three to four items each; see Appendix C for

correlations between parcels).

   To examine the goodness-of-fit of the model, absolute and incremental fit indices were

examined. The chi-square statistic (x^2) is an absolute fit index, but is very sensitive to sample

size (Schermelleh-Engel et al., 2003). Accordingly, additional fit indices including Root Mean

Square Error of Approximation (RMSEA; ideal range for our sample size: <.08 when CFI is

>/=.92), the Tucker Lewis Index (TLI), and the Comparative Fit Index, (CFI; ideal range for our

sample size: >/= .92) were used (Hair et al., 2010). All cross-lagged structural equation models had adequate fit based on the above-mentioned criteria. The autoregressive paths were strong for all models assessed with the strongest paths found for Anxiety$_{T1}$ $\rightarrow$ Anxiety$_{T2}$ ($\beta = .98$, $p < .001$).

Factorial invariance was also assessed using a longitudinal confirmatory factor analysis approach where equality constraints were placed on the parameters of each model (i.e., investigating a model in which the pattern of the factor loadings equate over time vs. a model in which the factor loadings are constrained to be equal over time; Little, 2013). Results showed that factorial invariance was supported for all models (i.e., a loss in fit ΔCFI < -.010, Cheung & Rensvold, 2001) and the models in which the factor loadings were constrained to equate over time were used as baselines for the cross-lagged analyses reported below.

Main SEM results: Positive emotions. The only positive emotion found to be significantly related to procrastination in undergraduate students was hope. More specifically, hope at Time 1 significantly negatively predicted procrastination at Time 2 ($\chi^2 = 164.852$, $df = 114$, $p = .001$, CFI = .976, TLI = .964, RMSEA = .035, 90% CI = .022-.048; Figure 15).

Main SEM results: Negative emotions. Significant findings were found for anxiety, shame, hopelessness, anger, and guilt in relation to procrastination. Anxiety at Time 1 significantly positively predicted procrastination at Time 2, and anxiety at Time 2 significantly positively predicted procrastination at Time 3 ($\chi^2 = 154.247$, $df = 114$, $p = .007$, CFI = .983, TLI = .974, RMSEA = .031, 90% CI = .017-.043; Figure 16). Shame and hopelessness at Time 1 significantly positively predicted procrastination at Time 2 (shame model $\chi^2 = 137.303$, $df = 114$, $p = .068$, CFI = .991, TLI = .987, RMSEA = .024, 90% CI = .000-.037; Figure 17; hopelessness model: $\chi^2 = 226.680$, $df = 114$, $p < .001$, CFI = .961, TLI = .942, RMSEA = .053, 90% CI = .042-.063; Figure 18). Time 1 procrastination was also found to significantly positively predict anger

at Time 2 (χ^2 = 195.483, df = 114, p < .001, CFI = .966, TLI = .948, RMSEA = .045, 90% CI =

.034-.055; Figure 19), however, stronger results showed procrastination to positively predict later

levels of guilt (from Time 1 to 2, Time 2 to 3; χ^2 = 122.946, df = 114, p = .267, CFI = .996, TLI =

.994, RMSEA = .015, 90% CI = .000-.031; Figure 20).

Summary of Study 2 Findings

Overall, results showed undergraduate students to report high levels of procrastination

across academic tasks. More specifically, of the three academic tasks assessed (writing term

papers, studying for exams, and keeping up with weekly readings), undergraduates

procrastinated most when writing their term papers and studying for their exams (Hypothesis 1a).

In addition, the undergraduate participants reported that procrastination was a problem for

themselves and wished to reduce their procrastination primarily with respect to writing term

papers and studying for exams (Hypothesis 1b, and 1c, respectively). Results also showed

academic procrastination to be negatively related to more adaptive/positive emotions (i.e., hope)

and positively related to more maladaptive/negative emotions (i.e., anxiety and guilt) in

undergraduates (Hypothesis 2a and 2b, respectively). Furthermore, the cross-lagged results

revealed a bidirectional pattern of effects between procrastination and emotions in which hope,

anxiety, shame, and hopelessness predicted subsequent procrastination (Hypothesis 3a), and

procrastination predicted subsequent anger and guilt in undergraduates (Hypothesis 3b).

Supplemental Analyses: Procrastination Frequency

Although previous research has independently examined the reported frequencies of

academic procrastination on writing term papers, studying for exams, and keeping up with

weekly readings among undergraduates (e.g., Kachgal et al., 2001; Solomon & Rothblum, 1984)
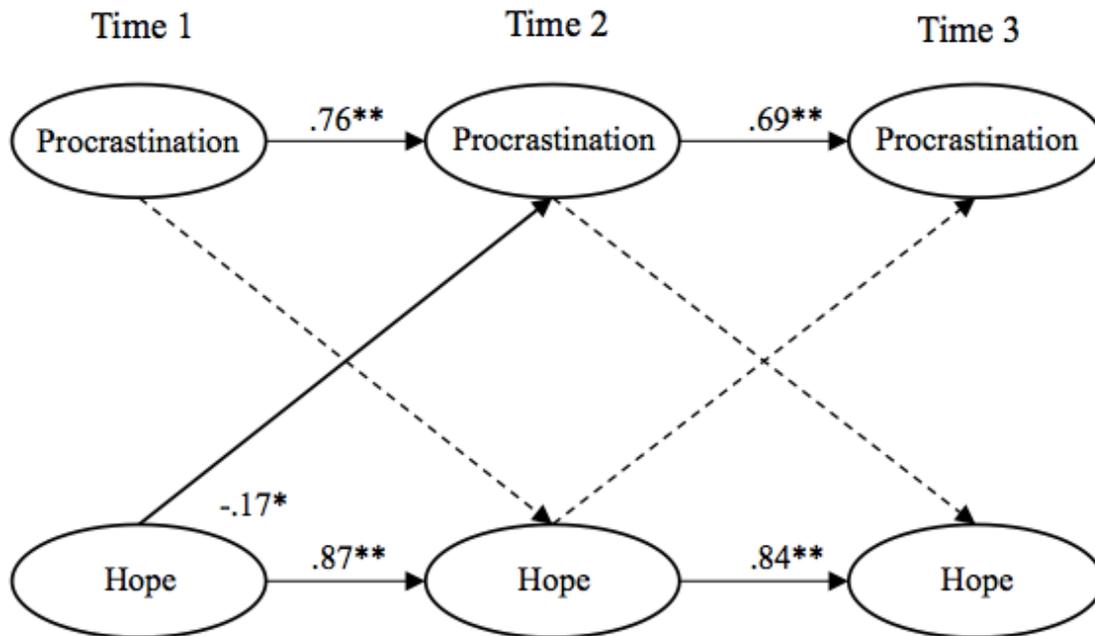
Figure 15. Cross-lagged results for procrastination and hope (undergraduates).
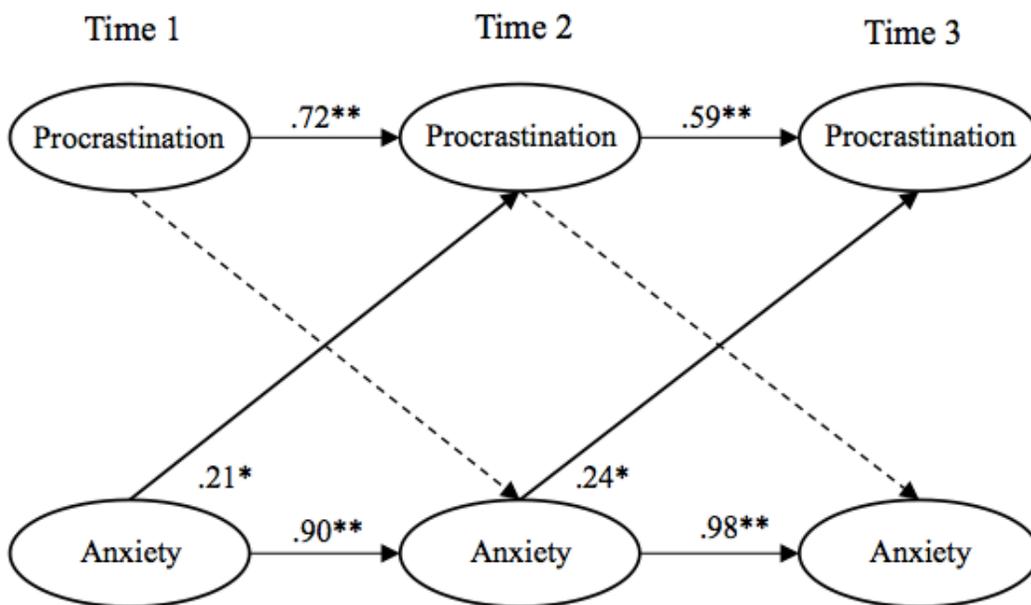
p < .05, **p* <.001.

Figure 16. Cross-lagged results for procrastination and anxiety (undergraduates).

p < .05, **p* <.001.
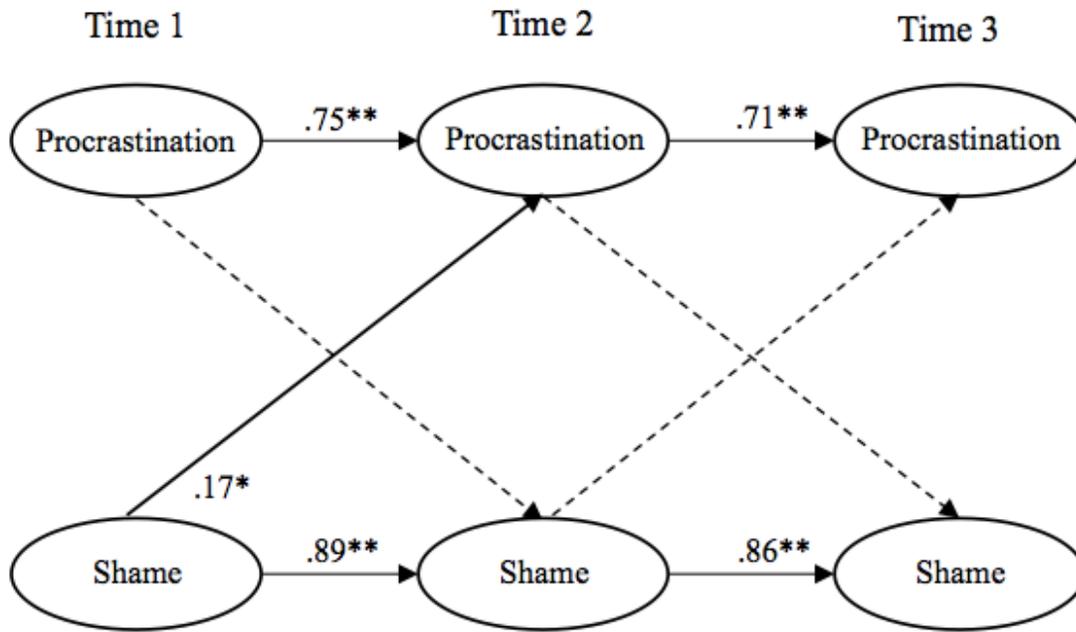
Figure 17. Cross-lagged results for procrastination and shame (undergraduates).
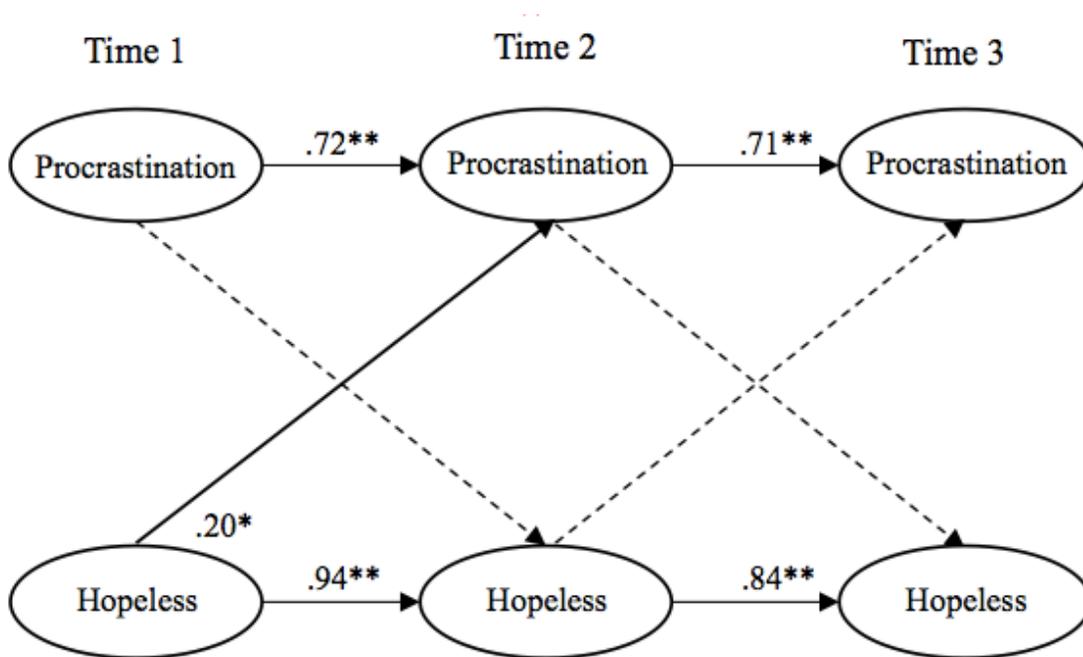
p < .05, **p* <.001.

Figure 18. Cross-lagged results for procrastination and hopelessness (undergraduates).
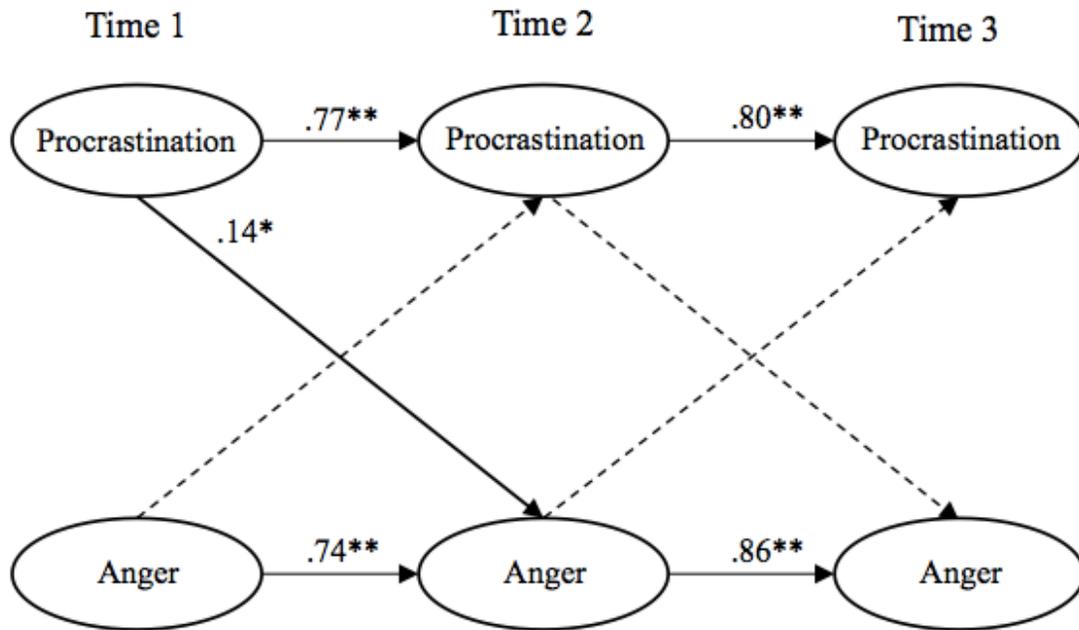
p < .05, **p* <.001.

Figure 19. Cross-lagged results for procrastination and anger (undergraduates).

p < .05, **p* <.001.
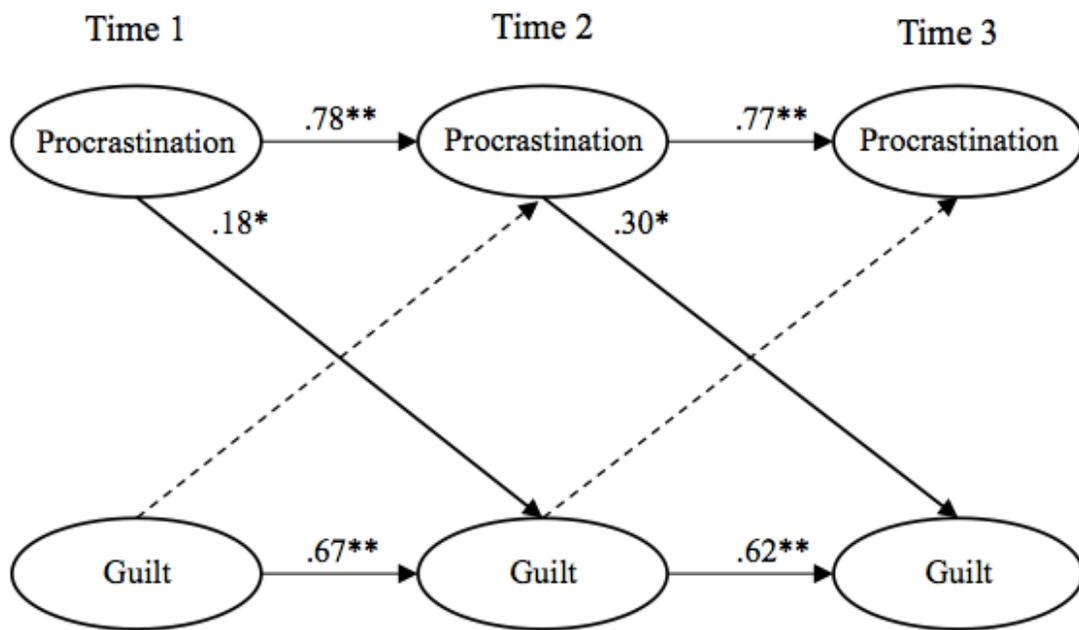
Figure 20. Cross-lagged results for procrastination and guilt (undergraduates).

p < .05, **p* <.001.

or among graduate students (Onwuegbuzie, 2004), the present data afforded analyses to directly compare procrastination frequencies, perceived aversiveness of procrastination, and desire to reduce procrastination on these specific tasks for these two groups. MANOVA results revealed a significant difference between the samples on procrastination frequencies across tasks, $F(3, 1023) = 10.63$, $p < .001$, Wilk's $\Lambda = 0.970$, with post hoc analyses showing undergraduates ($M = 3.64$) to procrastinate more when studying for exams than graduate students ($M = 3.29$, $F(1, 1025) = 24.03$, $p < .001$). MANOVA results additionally indicated a significant difference between the samples in the perceived problematic nature of procrastination across tasks, $F(3, 1023) = 18.64$, $p < .001$, Wilk's $\Lambda = 0.948$, with post hoc analyses showing undergraduates ($M = 3.28$) to view procrastinating when studying for their exams as significantly more problematic than did graduate students ($M = 2.78$, $F(1, 1025) = 42.26$, $p < .001$). Finally, MANOVA results additionally showed a significant difference between samples in the reported desire to reduce procrastination across academic tasks, $F(3, 1023) = 16.37$, $p < .001$, Wilk's $\Lambda = 0.954$, with post hoc analyses revealing that undergraduates ($M = 4.02$) wished to reduce their procrastination when studying for their exams to a significantly greater extent than did graduate students ($M = 3.09$, $F(1, 1027) = 38.09$, $p < .001$).

Discussion

Procrastination is defined as delaying an intended action despite being worse off for that delay; a behaviour in which many students engage specifically with respect to their academic tasks (Steel, 2007). According to the misregulation hypothesis, procrastination involves self-regulation failure such that students place attention on regulating experiences of negative emotions caused by academic tasks instead of regulating their learning behaviours towards goal accomplishment (Balkis & Duru, 2016). Despite this hypothesis, and empirical research showing

significant correlations between academic procrastination and emotions (e.g., anxiety: Beswick

et al., 1988; Ferrari, 1991; Pychyl, Lee, et al., 2000; hope: Alexander & Onwuegbuzie, 2007;

Zhou & Kam, 2016), empirical studies to date have not sufficiently examined: 1) the valence of

relations between academic procrastination and learning-specific emotions (e.g., vs. emotions

related to class, tests), 2) how these variables predict one another over time, and 3) differences

between graduate and undergraduate student populations with respect to their procrastination

frequencies and relationships with learning-related emotions. Following from previous research,

the purpose of the present dissertation was to shed light on some of these questions by looking at

how academic procrastination and learning-related emotions are associated with one another

both cross-sectionally and longitudinally in international samples of both graduate and

undergraduate students. Overall, the study hypotheses were partially supported with novel

findings obtained with respect to the directionality of associations between academic

procrastination and emotions.

Hypothesis 1: Frequency of Procrastination Behaviours

Although this research question was somewhat exploratory, out of the three academic tasks

(writing term papers, studying for their exams, and keeping up with their weekly readings), it

was hypothesized that graduate students would procrastinate most on keeping up with their

weekly readings consistent with Onwuegbuzie (2004), whereas undergraduate students would

procrastinate the most when writing their term papers (consistent with Kachgal et al., 2001;

Solomon & Rothblum, 1984; Hypothesis 1a). The results partially supported this hypothesis.

Different patterns of results were indeed observed between the prevalence/frequency of

academic procrastination with respect to writing term papers, studying for exams, and keeping

up with their weekly readings, such that graduate students indicated procrastinating most

frequently when writing term papers (62%) and keeping up with their weekly readings (60%). In

contrast, undergraduate students procrastinated most frequently when writing their term papers

(59.7%) and studying for their exams (58.5%), and slightly less frequently when keeping up with

their weekly readings (56.1%). Although Hypothesis 1 was supported for graduate students who

reported substantial procrastination when keeping up with their weekly readings, these results

also showed graduate students to procrastinate slightly more when writing their term papers. In

addition, although undergraduate students reported procrastinating the most when writing their

term papers, their procrastination across all academic tasks were relatively similar.

When comparing the procrastination frequencies across tasks in the present graduate

student sample with those obtained by Onwuegbuzie (2004), higher proportions of students in

the present study were procrastinating when writing their term papers (62% vs. 41.7%) and

studying for exams (45.6% vs. 39.3%). Equivalent proportions were found for procrastination

related to keeping up with weekly readings (60% vs. 60%). Similarly, undergraduate students'

procrastination frequencies were also higher than those reported in previous research (Solomon

& Rothblum, 1984) with respect to writing term papers (59.7% vs. 46%), studying for exams

(58.5% vs. 27.6%), and keeping up with weekly readings (56% vs. 30.1%). However,

undergraduate students' procrastination frequencies were relatively similar to those obtained

more recently by Kachgal et al. (2001; 59.19%/55.11%/56.46%, respectively for each academic

task). These findings thus indicated that graduate students in the present study reported higher

self-reported frequencies of academic procrastination on specific academic tasks as compared to

previous research with graduate students (Onwuegbuzie, 2004). In contrast, whereas

undergraduates in this study reported higher frequencies of academic procrastination compared

to undergraduates assessed decades ago (Solomon & Rothblum, 1984), they nevertheless reported frequencies similar to undergrads assessed more recently (Kachgal et al., 2001).

By way of explanation, one reason for the present results with graduate students may involve the topic of this study such that graduate students who self-identified as procrastinators may have been more inclined to agree to participate in this voluntary study exploring academic procrastination, and therefore exhibit higher levels of academic procrastination than the average student. Additionally, it is also possible that some students may have used this study as a way of procrastinating on their academic work as suggested by comments provided by graduate participants at the end of the questionnaire, such as: "I used your study to procrastinate on my work." Moreover, higher procrastination rates may also have been due in part to the online study methods in that studies, with more effortful in-person protocols (e.g., requiring physical attendance, completing hard copy questionnaires) perhaps attracting fewer students inclined to use the study as a means of procrastinating on academic tasks. As for the undergraduate student sample, the present results contribute to existing findings suggest that academic procrastination on these specific tasks has increased over the past few decades, perhaps due to the substantial increase in online distractions during this period (e.g., Facebook as an academic distraction; Meier, Reinecke, & Meltzer, 2016).

Following from the rationale presented in Hypothesis 1a, both graduate and undergraduate students were hypothesized to acknowledge procrastination on the three academic tasks as personally problematic. However, graduate students were expected to perceive their procrastination with respect to keeping up with their weekly readings to be more problematic than writing term papers and studying for their exams (as was found by Onwuegbuzie, 2004), whereas undergrads were expected to perceive their procrastination with respect to writing their

term papers as more problematic than studying for their exams or completing readings (as found

by Solomon and Rothblum, 1984, Hypothesis 1b). This hypothesis was partially supported.

Consistent with the aforementioned findings showing graduate students to report high levels of

procrastination on both writing term papers and keeping up with weekly readings, they also

perceived these two activities to be most problematic (35.3% and 33.1%, respectively; vs.

studying for exams, 24%), with undergraduates perceiving their procrastination when writing

term papers and studying for examinations to be the most problematic (39.1% and 41.4%,

respectively; vs. keeping up with weekly readings 34.4%).

Following from the rationale presented in Hypothesis 1a and 1b, both graduate and

undergraduate students were expected to reveal a desire to reduce their procrastination on each of

the specific academic tasks assessed, however, graduate students were expected to want to

decrease their procrastination on keeping up with their weekly readings more so than studying

for their exams or doing writing tasks (Onwuegbuzie, 2004), whereas undergrads were expected

to want to reduce their procrastination with respect to writing their term papers more so than the

other tasks (see Solomon & Rothblum, 1984; Hypothesis 1c). This hypothesis was only partially

supported. Once again, consistent with the previously mentioned findings for procrastination

frequency, writing term papers and keeping up with their weekly readings were also reported by

graduate students as the primary activities they wished to decrease (66.4% and 61.2%,

respectively; vs. 49.5% for studying for examinations), with undergraduates instead reporting a

desire to decrease their procrastination on writing term papers and studying for their

examinations (71.9% and 69.2%, respectively; vs. 62.1% for keeping up with weekly readings).

With respect to reported frequencies of procrastination across academic tasks, graduate

students were thus found to engage in more procrastination on writing and reading tasks as

compared to studying for examinations, whereas undergraduates procrastinated on a variety of academic tasks and tended to view their procrastination related to these tasks as equally problematic. According to the supplemental comparisons between graduate and undergraduate students on procrastination frequency across tasks, findings further suggested that undergraduate students more frequently engage in procrastination when studying for their exams as compared to graduate students. This trend is likely due to graduate programs that involve writing dissertations/theses necessarily requiring more reading and writing tasks as compared to completing exams (for a review of the role of writing support, requirements, and motivation in the graduate experiences of doctoral students, see Sverdlik, Hall, McAlpine, & Hubbard, 2018). Unfortunately, as the specific nature of the coursework and thesis/dissertation requirements for the present study participants was not assessed, this assumption is speculative in nature and warrants further examination in future research.

Interestingly, although graduate and undergraduate students frequently indicated that they procrastinated on their academic tasks, relatively fewer students reported that procrastination was *problematic* for them when writing term papers, studying for exams, and doing weekly readings. Based on these findings, it is possible that students' perceptions of what it means for procrastination to be problematic may have influenced their responses on the PASS questionnaire. For example, if students succeeded despite procrastination, they may not believe their procrastination to be problematic because they were "getting away with it." Alternatively, if students believe that they have control over their procrastination (e.g., can stop procrastinating when desired), they may similarly not perceive the behaviour as problematic. As seen in previous research, academic procrastination is not always found to correspond with negative academic outcomes, with some students reporting that procrastination allows for more time to plan a task

before starting, and higher levels of motivation when closer to the task deadline (Schraw et al.,

2007). Moreover, although academic procrastination tends to be negatively related to academic

performance (Kim & Seo, 2015), the behaviour may nevertheless persist if students perceive

their academic outcomes to be sufficient given that they procrastinated. For example, just as a

given student may be satisfied with an A grade on a test if they did not procrastinate, they may

be equally satisfied with a B+ if they did procrastinate, with such procrastination behaviours

being reinforced when students are rewarded for "getting away with it" (Klingsieck et al., 2013).

Another potential explanation may involve self-protective, defensive strategies such that if

students sincerely believe that procrastination is problematic (i.e., negative) they may wish to

dissociate themselves from it so as to protect their self-esteem (for a review, see Baumeister,

Campbell, Krueger, & Vohs, 2003). This assertion is consistent with findings with

undergraduates by Rahimi et al. (2016) showing students to rate procrastination that resulted in

failure as deserving of moral responsibility, albeit only when engaged in by others and not for

themselves. This possible explanation is also consistent with the present study findings showing

students who reported high levels of wanting to decrease their procrastination tendencies (i.e.,

the highest "definitely want to decrease" response option) to paradoxically also indicate that their

procrastination was not problematic. Although these assertions were not possible to examine in

the present study, they do offer some potential avenues for future research on the potential roles

of perceptions of academic procrastination and/or coping strategies (e.g., focus on the outcome

of procrastination, focus on self-regulatory control over procrastination, self-protective

strategies) in either mitigating or facilitating the link between academic procrastination

frequency and perceived aversiveness of procrastination. Overall, the present findings suggest

that the reported frequency, perceived aversiveness, and desired reduction of procrastination

behaviours differs between tasks, and between graduate and undergraduate students, with graduate students indicating writing term papers and keeping up with their weekly readings as the most problematic academic tasks, whereas undergraduates reported writing term papers and studying for exams as the most problematic academic tasks.

Hypothesis 2: Valence of Procrastination-Emotion Relations

As expected, for both graduate and undergraduate students, academic procrastination was significantly and negatively related to the positive emotions of enjoyment, hope, and pride based on zero-order correlations and the valences of cross-lagged paths in the structural equation models (Hypothesis 2a). These findings are consistent with previous research in which academic procrastination has been examined in relation to positive emotions (e.g., hope, Alexander & Onwuegbuzie, 2007; Zhou & Kam, 2016) and contributes to the larger literature on procrastination-emotion relations that to date has focused mainly on procrastination and negative emotional experiences. As these findings demonstrate, positive emotions also represent important affective variables to be examined as correlates of academic procrastination in educational settings, particularly feelings of hope that showed the strongest negative correlation with academic procrastination for both graduate and undergraduate students. More specifically, students who reported higher levels of hope in their abilities to learn and, to a lesser extent, greater enjoyment and pride in their academic work, were less likely to postpone their academic tasks, presumably due to anticipating successful task completion as well as positive experiences when learning.

Academic procrastination was also positively related to a range of negative emotions for graduate and undergraduate students including anger, anxiety, shame, hopelessness, boredom, and guilt (Hypothesis 2b). These outcomes are directly consistent with previous research that has

examined relations between academic procrastination and negative emotions (e.g., anger, anxiety, boredom; Blunt & Pychyl, 2000; Ferrari, 1991; Fee & Tangney, 2000; Klassen et al., 2008; Martinčeková & Enright, 2018; Onwuegbuzie, 2000, 2004; Solomon & Rothblum, 1984). However, a notable difference between previous empirical conclusions and those of the present study is the specificity of the negative emotions examined, in that none of the aforementioned studies examined the relationship between academic procrastination and students' emotions specific to learning experiences. In the present study, correlations revealed that students' negative emotional experiences while studying for exams, preparing papers, or completing academic tasks (e.g., anxiety scale items such as "You didn't think you knew enough to write the paper," "You really disliked writing term papers," or "You felt overwhelmed by the task") related to greater procrastination.

As academic procrastination is typically operationalized as involving the irrational predisposition to delay the start or completion of an academic task, the emotions that students experience as they begin a task and strive to complete such a task are of critical importance in understanding the inner workings of academic procrastination (Senécal et al., 2003). The present results provide preliminary evidence that both students' positive and negative emotional experiences correspond with their procrastination tendencies when working on academic tasks, and further provides support for the misregulation hypothesis in which self-regulation failure is assumed to occur in order to prioritize mood repair caused by negative emotions. Given that these results further indicate a moderate amount of the variance associated with academic procrastination to be reliably attributed to students' learning-related emotions (e.g., zero-order correlation magnitudes for hope, $r = -.43$ in graduate students, and $r = -.31$ in undergraduate students; anxiety, $r = .49$ in graduate students, and $r = .37$, in undergraduate students), these

findings thus underscore the importance of continued research on both positive and negative emotions as important affective correlates of academic procrastination.

Academic procrastination was related to various emotions for both the graduate and undergraduate student samples, however, the relative strength of the magnitudes of these associations was consistently found to be weaker for undergraduates across the emotions assessed (e.g., enjoyment, $r = -.31$ for graduate students vs. $r = -.20$ for undergraduate students). As most research to date on academic procrastination has focused on undergraduate students, this is a relatively novel insight within this field. Considering the literature reviewed in the introduction section showing academic procrastination in undergraduates to be significantly related to a variety of other psychological factors (e.g., personality traits, perceptions of competence, etc.), it is possible that emotion variables may simply explain less variance in undergraduates' procrastination behaviour than other, more stable psychological traits previously observed to explain substantial variance in academic procrastination for this student population.

However, it is also possible that graduate students may experience greater correspondence between their emotions and procrastination on academic tasks due to specific features of graduate training that qualitatively differ from undergraduate experiences. For example, it is possible that because graduate students are likely to have more invested in their studies, either financially (e.g., accumulated debt, family expenses; Longfield, Romas, & Irwin, 2006), task-wise (e.g., graduate theses being more demanding than course exams), or career-wise (e.g., training for more advanced, challenging academic or industry careers) than undergraduates, that procrastination on academic tasks in graduate school may also represent a more emotional experience than for undergraduates. This assumption is consistent with existing educational psychology research based on Pekrun's Control-Value Theory showing greater perceptions of

value to correspond with higher levels of both positive and negative learning-related emotions in students (e.g., Goetz, Pekrun, Hall, & Haag, 2006). This assertion is additionally consistent with findings showing graduate students to exhibit strong emotional attachments to specific academic tasks (e.g., experiencing strong negative emotions when engaging in writing tasks that are perceived as reflecting their academic identity; Aitchison, Cotterall, Ross, & Burgin, 2012). In any case, as these assertions are beyond the scope of the present study, due to lacking assessments of financial security, task value, or career-related concerns, future research is needed to examine the extent to which these and other specific characteristics of the graduate experience are responsible for procrastination being a more emotional experience for graduate students as compared to undergraduates.

Hypothesis 3: Directionality of Procrastination-Emotion Relations

      Hypothesis 3a: Emotions predicting procrastination. For both the graduate and undergraduate students, Hypothesis 3a was supported with respect to the emotions of hope, shame, and hopelessness. More specifically, there were directional relationships observed in the cross-lagged analyses in which hope negatively predicted subsequent academic procrastination, with shame and hopelessness also positively predicting successive academic procrastination. In addition, support for Hypothesis 3a was found for graduate students' feelings of pride that negatively predicted subsequent academic procrastination, and for feelings of anxiety in undergraduates that positively predicted later procrastination behaviour.

      With respect to *positive emotions*, hope negatively predicted academic procrastination for both graduate and undergraduate students, such that students who had an optimistic perspective towards learning and felt confident when studying were less likely to engage in procrastination on their academic assignments. This finding is consistent with cross-sectional findings from

Alexander and Onwuegbuzie (2007) showing graduate students with high levels of hope to be less likely to engage in procrastination on academic tasks including writing papers, studying for exams, and weekly readings. Also, the current findings elaborate on the negative correlation between hope and procrastination in undergraduates found by Zhou and Kam (2016). Furthermore, the present results expand on more recent findings in which low levels of positive affect were found to relate positively with more time spent procrastinating on academic tasks (Sirois & Giguère, 2018). Our results thus mirror earlier cross-sectional findings in showing students who were hopeful that they could efficiently begin and complete their work (e.g., AEQ questionnaire items such as: "I have an optimistic view towards studying" and "I feel confident towards studying") to be consistently less likely to engage in subsequent academic procrastination over time (i.e., hope negatively predicted students' academic procrastination). Moving beyond correlations, the present results demonstrate that both graduate and undergraduate students who report higher levels of hope in their academic abilities were subsequently less likely to engage in procrastination on later academic tasks. In addressing a lack of prior research on the role of pride in academic procrastination, the present findings further showed feelings of pride to also negatively predict subsequent academic procrastination, albeit only for graduate students. Graduate students who felt greater pride in their learning-related capabilities and accomplishments (e.g., AEQ questionnaire items such as: "I'm proud of my capacity" and "I think I can be proud of my accomplishments at studying") were less likely to exhibit academic procrastination.

These findings for hope and pride thus suggest that positive emotions may serve to motivate students towards task completion and avoid procrastination, especially students in graduate degree programs. This assumption is consistent with Pekrun's (2014) Control-Value

Theory in which activating positive emotions such as hope are assumed to enhance motivation to learn and facilitate optimal self-regulated learning (e.g., reducing self-regulation failure by way of academic procrastination). However, as the present study did not obtain the requisite self-regulation data to test this mediational hypothesis, it is deserving of further study in future research. Moreover, as the pattern of results for feelings of hope and pride was most evident for graduate students, this finding could also signify that positive emotions may play a larger role in the prevention of procrastination behaviours for students in graduate programs. As outlined above, although this stronger relation between positive emotions and procrastination behaviours may be due to higher levels of importance placed on academic tasks in graduate programs (e.g., feelings of pride on writing tasks aligned with one's academic identity; Aitchison et al., 2012), this value-related mediational assumption is speculative and requires examination in future work

      With respect to directional effects of *negative emotions* on procrastination, shame and hopelessness were positively related to subsequent academic procrastination later in the academic year for graduate students, with the same pattern of results found for undergraduates earlier in the year. Students who were ashamed of their learning deficits (e.g., AEQ questionnaire items such as: "I feel ashamed that I can't absorb the simplest of details" and "My memory gaps embarrass me") were more likely to engage in academic procrastination later in the year. These results thus expand upon previous cross-sectional research in which academic procrastination was found to negatively relate to shame-proneness (Fee & Tangney, 2000; Martinčeková & Enright, 2018). Similar to shame, graduate and undergraduate students who felt hopeless in their academic pursuits (e.g., AEQ questionnaire items such as: "I worry because my abilities are not sufficient for my program of studies" or "I wish I could quit because I can't cope with it") were also more likely to engage in academic procrastination later in the year. Finally, for

undergraduate students, anxiety consistently predicted academic procrastination throughout the year, showing greater worrying about learning activities (e.g., AEQ questionnaire items such as: "When I look at the books I still have to read, I get anxious" and "I worry whether I have properly understood the material") to consistently lead to academic procrastination in the undergraduate sample.

As for potential explanations for the above effects, it is possible that both graduate and undergraduate students may have procrastinated on academic tasks to remedy feelings of embarrassment and shame due to perceptions of low ability (e.g., memory gaps) so as to preserve their self-image by avoiding learning and the associated insecurities. These findings alternatively suggest that graduate and undergraduate students who feel hopeless about their studies may also experience exhaustion that undermines their energy and motivation for goal pursuit (for theoretical assertions on the role of hopelessness in academic persistence, see Pekrun & Linnenbrink-Garcia, 2012). Moreover, following directly from the misregulation hypothesis (Balkis & Duru, 2016), it is possible that feelings of nervousness, fear, and worry regarding one's capabilities to understand academic materials when learning, particularly as an undergraduate, could lead to academic procrastination so as to remedy these unpleasant affective states. However, despite the plausible nature of these assertions, they were not testable in the present data sets and represent valuable topics for future research on mediational paths between academic procrastination and negative emotions (e.g., utilizing larger, multi-item measures of self-efficacy, physical and/or emotional exhaustion, avoidance motivation).

Thus, beyond potential mediational paths involving exhaustion (e.g., hopelessness) or avoidance (e.g., anxiety), these results imply that perceptions of competence may also serve a critical role in mitigating procrastination in graduate and undergraduate students. Just as students

who experienced negative emotions (e.g., shame, hopelessness, and anxiety) tended to focus more on their lack of ability, students who experienced hope and pride were instead more focused on their goals and self-assured in their abilities (see sample items above for ability-related language in emotion scales). Whereas students who perceived their capabilities as limited and accordingly feel anxious, shame, and hopeless were more likely to subsequently procrastinate on academic tasks, students who believed in themselves and felt more capable tended to experience feelings of hope and pride that, in turn, lead to lower procrastination. These findings are in line with the misregulation hypothesis in showing students' negative self-perceptions with respect to learning activities to coincide with negative emotional experiences that consequently lead to maladaptive procrastination behaviours.

Hypothesis 3b: Procrastination predicting emotions. For both the graduate and undergraduate student samples, Hypothesis 3b was supported for feelings of anger, such that there was a directional relationship in which academic procrastination negatively predicted subsequent anger. In addition, support for Hypothesis 3b was found for boredom in graduate students and guilt in undergraduates. These findings are thus consistent with previous research showing anger to be negatively linked with academic procrastination among undergraduate students (Ferrari & Olivette, 1994) in showing both undergraduate and graduate students who engaged in procrastination to subsequently experience greater anger due to their inability to stay on track with their goals (e.g., APSI questionnaire items such as: "I allowed myself to get distracted from [my] work" or "I gave up studying early in order to do more pleasant things").

Findings showing procrastination to positively predict boredom earlier in the year were only found for graduate students and also support research conducted by Blunt and Pychyl (1998) who proposed that students who engage in procrastination may not be able to work on

boring academic tasks. Consistent with this assertion, graduate students who reported greater

academic procrastination also subsequently reported greater boredom with respect to having little

desire to study (e.g., AEQ questionnaire item: "Because I'm bored I have no desire to learn" or

APSI questionnaire items: "I drifted off into day dreams while studying" and "I had no energy to

study"). Since boredom is often considered a deactivating negative emotion that typically leads

to inaction due to the inability to generate intrinsic interest and motivation (Pekrun, 2014;

Vodanovich & Rupp, 1999), the finding that procrastination predicted boredom, as opposed to

vice versa, may seem counterintuitive. However, consistent with Pekrun et al. (2014) showing

boredom to potentially serve as both an activity-related emotions (predicting achievement-

striving) and an outcome-related emotion (predicted by achievement striving), these findings

suggest that students who already procrastinated on academic tasks may further disengage from

these tasks, perhaps due to these tasks being monotonous or no longer holding personal value.

Lastly, Hypothesis 3b was supported for guilt in undergraduate students. Cross-lagged

findings showing academic procrastination to predict stronger feelings of guilt throughout the

term is consistent with previous research showing students who engage in procrastination to

eventually experience guilt due to enjoying an alternative, distracting activity (Lavoie & Pychyl,

2001; Pychyl, Lee, et al., 2000). The present findings thus demonstrate that undergraduates who

procrastinate end up consistently feeling guilty for their actions, likely due to a persistent

awareness of these behaviours showcasing their lack of engagement (e.g., APSI questionnaire

items such as: "Allowed [myself] to be distracted from [my] work" or "Gave up studying early in

order to do more pleasant things"). Thus, Hypothesis 3b was only supported for negative

emotions (anger, boredom, and guilt) with higher levels of academic procrastination found to

predict greater subsequent levels of specific negative affective states.

These findings extend previous cross-sectional research examining the relationship between academic procrastination and negative emotions (e.g., positive relationship between academic procrastination and anxiety) in providing longitudinal evidence for the misregulation hypothesis (i.e., students procrastinate because they prioritize the regulation of negative emotions elicited by academic tasks over goal accomplishment). In addition, based on the wording of the questionnaire items (e.g., "I worry whether I have properly understood the material"), the current findings also point to the possibility that motivational variables (e.g., perceived competence, self-regulation, etc.) may influence student procrastination, partially supporting the underregulation hypothesis (i.e., students procrastinate because they lack self-regulation abilities). In the present study, questionnaire items measuring different learning-related emotions involved judgments and perceptions of one's abilities, therefore future research is encouraged to investigate such possible mediational hypotheses (e.g., motivational variables → affective states → academic procrastination).

Hypothesis 3c: Simultaneous prediction. Simultaneous directional relationships between academic procrastination and emotions were also hypothesized as potential patterns of relations, such that the effects of each variable on the other may be observed concurrently. Although not significant, the cross-path from anxiety at Time 1 to academic procrastination for graduate students at Time 2 approached significance ($p = .058$), providing some evidence for Hypothesis 3c given that the path from Time 1 procrastination to Time 2 anxiety was statistically significant in this model. As for the remaining cross-lagged models, study findings did not show significant simultaneous directional paths between procrastination and emotions, with the results overall thus showing Hypothesis 3c to not be empirically supported by the present data.

Hypothesis 3d: Sequential prediction. Sequential predictive relationships between academic procrastination and emotions (e.g., Time 1 procrastination to Time 2 emotion, Time 2 emotion to Time 3 procrastination) were found only for graduate students and specifically with respect to the emotions of enjoyment, anxiety, and guilt. More specifically, greater enjoyment at Time 1 predicted lower academic procrastination at Time 2 that, in turn, negatively impacted subsequent enjoyment at Time 3. Conversely, higher levels of academic procrastination at Time 1 predicted more anxiety and guilt at Time 2 that, in turn, predicted greater academic procrastination at Time 3.

The finding of sequential directional relations for enjoyment is directly consistent with the misregulation hypothesis in which students' emotions are proposed to impact subsequent procrastination, and further extends this hypothesis in showing this assertion to not only apply to more negative emotions but also lower levels of positive emotions. This finding is also consistent with procrastination research showing academic procrastination to be positively associated with task aversiveness (e.g., Lay, 1991) in suggesting that students procrastinate when they are not enjoying their tasks (e.g., not endorsing AEQ questionnaire items such as: "I look forward to studying" and "Certain subjects are so enjoyable that I am motivated to do extra readings about them"). Moreover, this study additionally showed procrastination to also lead to lower enjoyment later on, thus showing procrastination to not only increase negative emotions over time, as would be assumed given the preponderance of existing procrastination research focusing exclusively on negative emotions, but to also reduce positive emotions thus showing procrastination to be even more detrimental for students' overall affective well-being than previously assumed.

As procrastination was found to predict greater anxiety and guilt in graduate students earlier on in the year, this finding is not consistent with Tice and Baumeister (1997) who found

procrastination earlier in the academic year to be negatively related to stress in undergraduates. More specifically, whereas procrastinating on academic tasks should create more anxiety and guilt later on as deadlines are approaching due to the student feeling unprepared, it should predict less anxiety earlier on due to the task avoidance presumably occurring as a response aimed at reducing task anxiety (i.e., misregulation hypothesis). Nevertheless, as anxiety and guilt did more strongly predict greater subsequent academic procrastination later in the year, these findings are partially consistent with the misregulation hypothesis and Tice and Baumeister who similarly found a positive relationship between academic procrastination and stress later in the year with undergraduates. One explanation for this finding may be that graduate students' anxiety and guilt for their procrastination earlier in the year (i.e., before the first phase of the present study began) may have put them in unfavorable situations (e.g., not enough time to complete their tasks) that led to more procrastination so as to avoid these negative emotional states. In addition, as previously mentioned, this finding for graduate students may also reflect these students tending to start the academic year and their graduate programs with a clear sense of how important their success on academic tasks is with respect to their substantial existing investments (e.g., financial and personal life sacrifices), thus making procrastination on academic tasks a much more emotional experience as compared to undergraduates (Aitchison et al., 2012; Longfield et al., 2006).

Study Limitations and Future Directions

When considering the contributions of the present studies to existing research on procrastination and emotion relations, it is also important to recognize critical limitations of this research pertaining to assessment (e.g., characteristics of the scales, domain-specificity, timing of assessments, task information), methodology (e.g., alternative methodological approaches), and

participant characteristics (e.g., possible mediating or moderating variables). With respect to *assessment issues*, the potential confound of inconsistent retrospective time frames referenced in the preambles used in the assessment of academic procrastination and learning-related emotions may have impacted the results. Although the Academic Procrastination State Inventory (APSI, Schouwenburg, 1992) did ask questions about procrastination that were directly related to learning and studying (e.g., "Prepared to study at some point of time but did not get any further"; Haghbin, 2015), and was thus consistent with the domain-specificity of the emotion scales, the preamble for this questionnaire asked students to report how frequently they engaged in thoughts/behaviours *within the last week*. In contrast, the Achievement Emotions Questionnaire (AEQ; Pekrun et al., 2002) and guilt measure required students to recall typical studying occurrences that have occurred *throughout their studies* and did not specify a retrospective time frame. This divergence in these preambles may thus have confounded the results since procrastination behaviours were reported with respect to a specific timeline, whereas learning-related emotions and guilt were more globally assessed and not time delimited.

A related limitation of the present study is the lack of domain specificity with respect to the academic procrastination and emotion measures in that students were not asked to think about a specific academic task (e.g., biology exam on September 21st) when answering the self-report measures. By using both task- specific and domain-general measures of procrastination and emotions, a more in-depth understanding of their relations would be observed by allowing for more situation-specific findings, while retaining generalizability. Additionally, although the present study examined students' emotional experiences with respect to the domain of learning, it did not examine students' emotions with respect to specific learning experiences (e.g., epistemic emotions while engaging with complex material) or performance-related experience

(e.g., emotions faced in testing situations) that may have shown a different pattern of relations with academic procrastination over time in graduate and undergraduate students.

An additional potential shortcoming of focusing solely on learning-related emotions pertains to the inability to accurately assess why these emotions were predicting or being predicted by academic procrastination. More specifically, it is possible that students may experience negative emotions for several different reasons, such as low perceptions of ability, high challenge due to features of the task, cognitive incongruity, etc. The additional information provided by assessing more specific emotional experiences, such as epistemic emotions (e.g., students experiencing frustration when faced with complex materials) could help extrapolate or triangulate the present findings.

Similarly, it is also possible that the timing of the assessments and the specificity of the tasks that students were asked to imagine when answering the questionnaire items may have impacted the present findings. More specifically, students indicated in the comment sections of the survey that some of the time points at which the survey was administered interfered with specific holidays (e.g., thanksgiving) or deadlines (e.g., mid-term and final examinations) and introduced bias into their results (e.g., they reported higher procrastination because the assessment occurred close to a given deadline). Although the assessments used were targeting trait measures of academic procrastination and learning-related emotions, the APSI did ask students to report behaviours/thoughts pertaining to academic procrastination experienced within the last week and thus may have more closely aligned with cultural events or deadlines (e.g., mid-terms) at some institutions (e.g., U.S., Canada) and not others (e.g., Europe). Moreover, although attrition between study phases is common (e.g., longitudinal procrastination research: Pychyl, Morin, et al., 2000), the timing of the study phases coinciding with particular

events/deadlines may also help to explain the substantial attrition observed (e.g., 61% attrition from Time 1 to 2 for graduate students, 52% attrition from Time 1 to 2 for undergraduate students). Recruiting participants from a single institution to complete course- or program-specific measures would remedy these issues by providing accounts of procrastination and learning-related emotions with respect to specific deadlines and tasks. In addition, other approaches could be taken to help reduce attrition rates such as compensation for all participants instead of a draw for limited prizes, or personalized diagnostic information being provided to each participant (e.g., personal percentiles informing specific recommendations on how to reduce academic procrastination).

Future domain-specific research at a specific institution would also assist in understanding the observed differences between graduate student and undergraduate student procrastination given that the tasks completed by students could be explicitly identified and held constant. For example, our results showed that graduate students procrastinated when writing term papers and doing weekly readings, whereas undergraduate students reported procrastinating almost equally when writing term papers, studying for exams, and completing weekly readings. Although these reports do indicate that procrastination occurs across a variety of academic tasks, it does not indicate the tasks students most frequently complete (e.g., graduate students writing papers vs. undergraduate students completing more exams). Such information may also help explain why graduate students' emotions were more strongly related to academic procrastination later on the in academic year, whereas directional relationships were instead observed for undergraduates earlier on in the fall season.

Further research to investigate what students do instead of their academic work when engaging in academic procrastination is also encouraged. For example, some students may

procrastinate on a given academic task by completing an important task for another class (i.e., productive procrastination), whereas other students may procrastinate by watching television (Pychyl, Lee, et al., 2000). Also, greater understanding of the specific characteristics of the tasks on which students procrastinate would be beneficial (e.g., subject area). For example, perhaps students who experience more statistics anxiety engage in procrastination on their statistics homework than on homework in other subject areas, whereas other students may experience anxiety on all academic tasks and engage in academic procrastination more habitually. Understanding more about the tasks that students are typically presented with and the tasks on which students procrastinate would help shed light on some of these differences.

Furthermore, the assessment of academic procrastination itself may have been problematic, as mentioning academic procrastination may have reminded students of the drawbacks of engaging in such behaviours thereby acting as an intervention. This assertion is supported by comments left by students at the end of the survey such as "Doing this study helped me reflect on why I am not writing my thesis" or "Interesting to see how I answer, good self-reflection." Relatedly, students may have also used participation in this study to procrastinate on their academic tasks, as was suggested by comments such as "Your study was a great way to procrastinate" and "Procrastinated studying to do this quiz." Accordingly, intervention effects could have confounded the results of this study by reducing subsequent reports of procrastination due to students' awareness of their procrastination behaviours. Alternatively, the enabling aspects of study participation could have also exacerbated procrastination reports and led to a unrepresentative sample consisting primarily of students who were seeking online procrastination, particularly with respect to the graduate student sample (procrastination

frequencies for the undergraduate sample paralleled those of recent research; e.g., Kachgal et al.,

2001).

With respect to *methodological concerns*, the present dissertation provided evidence for

directional paths between certain learning-related emotions and academic procrastination.

According to Adachi and Willoughby (2015), given that each variable was assessed controlling

for baseline levels of that variable (e.g., autoregressive paths between Time 1 procrastination →

Time 2 procrastination, and Time 2 procrastination → Time 3 procrastination), these controls for

stability effects dramatically reduced the potential magnitudes of the cross-paths between

variables in the cross-lagged models (e.g., Time 1 anxiety → Time 2 procrastination). As most of

the autoregressive paths were relatively high in magnitude (e.g., .70-90), the present models

reflected considerable temporal stability thus making it difficult to find significant cross-paths.

However, as multiple cross-paths were significant in the present studies, these results can be

interpreted with confidence given the conservative nature of this analytical design.

Although the present paper addressed a critical gap in the current literature regarding the

limited studies employing longitudinal methods, other approaches are encouraged to help further

extrapolate and support the findings. For example, objective behavioural observations of

academic procrastination would be informative, similar to studies that examine how late students

choose to hand in a given assignment when permitted to ask for an extension (e.g., Solomon &

Rothblum, 1984). Such approaches would help to minimize confounds with respect to the

students' academic timelines as well as self-report bias resulting from repeatedly completing

self-report questionnaires. Similarly, assessing students' objective achievement levels would

help to shed some light on whether students who perceive academic procrastination as not

problematic for them nevertheless engage in it because they are able to obtain good grades

despite procrastinating, thereby reinforcing their procrastination behaviour (for findings on elevated self-efficacy after good grades despite procrastination, see Schraw et al., 2007).

Alternatively, experimental methods could be used to measure students' procrastination and emotional experiences to infer causation through the examination of manipulated levels of academic procrastination and/or emotions (e.g., anxiety). Experimental methods would permit considerable control over the research environment and contribute significantly to mitigating possible confounding variables. Also, as most of the research on academic procrastination has to date been done using quantitative methods, qualitative methods, such as longitudinal interviews concerning students' academic procrastination and affective experiences, could be conducted to triangulate the present findings. This sequential explanatory mixed-methods design strategy would involve using the interviews as an opportunity to help explain or interpret the findings obtained from the quantitative segment of the data collection (Creswell, 2013). For example, when asking about their reasons for engaging in academic procrastination, graduate and undergraduate students could be able to better qualify the specific nature of the emotions examined in relation to their procrastination behaviours (e.g., procrastination being predicted more by anxiety due to lack of confidence in one's abilities vs. anxiety due to a demanding curriculum).

Similarly, an experience sampling method (ESM) of data collection, capturing real-time procrastination and corresponding emotional experiences, would provide researchers with state assessments of these variables thereby complementing the more retrospective, trait-based measures assessed in the present study (Csikszentmihalyi, Larson, & Prescott, 1977). Experience-sampling methods would involve digitally soliciting students' responses in real-world learning situations (e.g., a cell phone beep). As the intention-action gap can be quite small,

being able to ask students to report their procrastination tendencies as they are happening (e.g., a few times a day), would provide researchers with valuable data pertaining to these behaviours and emotions in naturalistic settings and contribute to the present findings by perhaps allowing for the simultaneous effects of more than one emotion on procrastination to be more clearly observed (for use of ESM findings showing academic procrastination to be associated with perceived aversiveness and feelings of guilt, see Pychyl, Lee, et al., 2000). By examining students in real-time, researchers are better able to get a more ecologically valid account of how students spend their time while procrastinating and of the affective states experienced by students as they are procrastinating with minimal self-report biases (Pychyl, Lee, et al. 2000).

With respect to limitations pertaining to *participant characteristics*, it is difficult to generalize the results of these studies given the imbalances in demographic variables, specifically with respect to gender. In both studies, the distribution of gender was not equal (graduate students: 80% female, 17% male; undergraduates: 74% female, 23% male). This imbalance is not uncommon in research on academic procrastination, and according to the preliminary analyses presently reported, did not confound relations between the main study variables. Nevertheless, more research is needed to examine the associations between procrastination in male students as well as students reporting alternative gender identities.

As the present studies were exploratory in nature, it is also possible that other unexamined variables could have mediated or moderated these results. For example, beliefs about one's abilities appears to have been the main contributing factor in predicting what learning-related emotion students experienced during learning activities (based on the questionnaire items). Research has shown procrastination to correlate negatively with self-efficacy (Cerino, 2014; Haycock, et al., 1998; Hensley, 2014; Klassen et al., 2008; Tuckman, 1991), with Pekrun's

(2006) Control-Value theory further positing that perceptions of control represent a critical predictor of students' emotional states. Therefore, it is possible that if students' perceptions of control or competence may be responsible for observed relations between procrastination and emotions in this study, with such variables recommended to be examined in future research as potential mediators.

Similarly, it is possible that perceptions of value may serve as a moderating variable in that procrastination-emotions relations should be stronger for tasks perceived by students as more important or intrinsically rewarding in nature. As research has found students to be less likely to procrastinate on tasks they deem important (Pychyl, Lee, et al., 2000) or enjoyable (Lay, 1991), with Pekrun's (2006) Control-Value theory further proposing perceptions of value to critically predict students' emotional experiences, further research examining perceived value as a moderating variable is recommended to examine the extent to which the present findings generalize across academic tasks of differing value. In addition, although weak correlations and marginally significant findings were obtained pertaining to some of the demographic factors (e.g., relationship status), these personal variables do shed some light on demographic variations in the present samples and future research could investigate the potential mediating or moderating roles that such variables have on academic procrastination, in addition to other personal beliefs (e.g., self-efficacy) or cognitive appraisals (e.g., perceptions of control and value).

Implications of Study Findings

The results of the present studies demonstrate several important implications for graduate and undergraduate students. The literature review on academic procrastination revealed that procrastination is often considered an anthropological ailment due to it having been recorded in

history long ago yet remaining prevalent today (Steel, 2007), with academic procrastination being most commonly defined as the needless postponement of academic tasks despite the expectation of negative consequences. The principal purpose of this research was to review the literature on academic procrastination to better understand how it is defined and differentiated from related constructs, as well as review its consequences, correlates, and antecedents, with a specific emphasis on students' emotions. In doing so, a notable gap in the empirical research literature concerning the association between academic procrastination and emotions was discovered in that studies have to date not directly investigated the assumed directionality of the relationships between academic procrastination and emotions experienced by students. The present dissertation thus contributes to the existing literature on academic procrastination by providing a better understanding of the role that emotions play in self-regulation failure. Although studies have consistently looked at emotions as assumed correlates or consequences of procrastination, the present research sought to verify these assumptions by examining the longitudinal effects of emotions on procrastination and vice versa.

It is anticipated that by learning more regarding the associations between procrastination and emotions in students, researchers can create more effective emotion regulation interventions in educational settings (e.g., improving emotion regulation skills to reduce procrastination, Eckert, et al., 2016). For example, following from the present findings showing guilt and anxiety to be the strongest predictors and outcomes of academic procrastination, it is possible that emotion regulation interventions could be improved by focusing on helping students find adaptive ways of regulating high-arousal emotions (e.g., anxiety, guilt). In the absence of such information, at-risk students may otherwise find themselves in a loop whereby their anxiety

initiates procrastination tendencies that, in turn, elicits more anxiety and ultimately impairs their

academic achievement and well-being.

In accordance with the underregulation hypothesis, intervention studies for students that

focus on reducing procrastination have also targeted not only students' emotions but also their

self-regulation behaviours. Sims (2014) further proposed four broad themes underlying academic

procrastination behaviours that could be targeted by intervention techniques (i.e., low task

enjoyment, expectation of negative outcomes, perceived inability to perform a task, and

distractions from more attractive tasks). Although these themes align mostly with the

underregulation hypothesis, fear of failure (preoccupation with negative outcomes as a reason for

procrastination) is best understood as reflecting the misregulation hypothesis. The author also

connected these themes to specific self-regulation shortcomings (e.g., low task enjoyment = lack

of intrinsic motivation; expectation of failure = performance anxiety; low perceived ability = low

self-efficacy), and proposed cognitive-behavioural coaching addressing these self-regulatory

deficiencies as a method to reduce academic procrastination.

For example, if students are procrastinating because they are scared of failing on academic

tasks, a coach could work with them to encourage more adaptive thoughts and beliefs concerning

academic challenges (e.g., teaching techniques to manage performance anxiety to students who

fear failure or persistently expect negative outcomes). In the same way, the results in the present

study could inform this type of intervention program for both graduate and undergraduate

students. More specifically, cognitive-behavioural coaching could be used to help students with

academic procrastination tendencies learn techniques for increasing their focus on mastery and

self-efficacy beliefs by teaching self-regulation strategies such as planning and organizing their

time (e.g., based on research showing negative relationships between procrastination and time

management, Lay & Schouwenburg, 1993; for more on time management interventions, see Häfner, Oberst, & Stock, 2014). Furthermore, recent research suggests that cognitive behavioural therapies may also help to reduce procrastination behaviours (e.g., for a recent meta-analyses on the psychological treatments for procrastination, see Rozental et al., 2008; van Eerde and Klingsieck, 2018).

Following from the present study findings showing procrastination to not only predict lower subsequent learning-related enjoyment, but also occur as a result of lack of task enjoyment (e.g., graduate students), these results also support the use of interventions addressing enjoyment or intrinsic motivation in students given their potential effects on curbing procrastination behaviour. In support of this assertion, Scent and Boes (2014) showed a psychological treatment referred to as "acceptance-commitment therapy" to reduce procrastination in university students through workshops enhancing awareness of procrastination habits as well as strengthening students' intrinsic values. As noted previously, to the extent that motivational beliefs may underlie negative emotional experiences (e.g., low self-efficacy may increase anxiety), these types of multifaceted interventions are encouraged in addition to interventions focusing specifically on emotion regulation.

Conclusions

As anticipated, the results showed academic procrastination to be negatively related to more adaptive/positive emotions (enjoyment, hope, and pride) and positively related to more maladaptive/negative emotions (anger, anxiety, shame, hopelessness, boredom, and guilt) in both graduate and undergraduate student populations. However, the strengths of these associations were stronger for graduate students, suggesting that procrastination in higher education is more tied to emotional experiences when learning/studying in graduate programs as compared to

during undergraduate education. Furthermore, cross-lagged models revealed bidirectional

configurations of effects between academic procrastination and learning-related emotions.

Enjoyment, anxiety, hope, and guilt were observed to be the strongest predictors of academic

procrastination, as demonstrated by the consistent and/or successive effects over time. Whereas

hope consistently predicted subsequent academic procrastination throughout the academic year,

sequential patterns were found for anxiety and guilt in which academic procrastination predicted

higher levels of the emotion earlier in the year that, in turn, led to higher procrastination later in

the year. Given that enjoyment and anxiety/guilt were found to correlate negatively with

enjoyment, it is perhaps not surprising that similar sequential pattern of relations in the opposite

direction was also found for enjoyment. In contrast, cross-lagged findings for the undergraduate

sample showed only bidirectional patterns of effects between academic procrastination and

emotions. Overall, students' feelings of hope, anger, anxiety, shame, hopelessness, and guilt all

demonstrated substantial relationships with academic procrastination both cross-sectionally and

over time, underscoring the principal study premise that procrastination is indeed strongly related

to the types of emotions students experience over time while learning, and can both influence

and be influenced by students' emotions depending on the educational context (graduate vs.

undergraduate programs) or emotion type (e.g., hope vs. anxiety).

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Appendix A

Sample Supplemental Cross-lagged Models (Graduate Students)
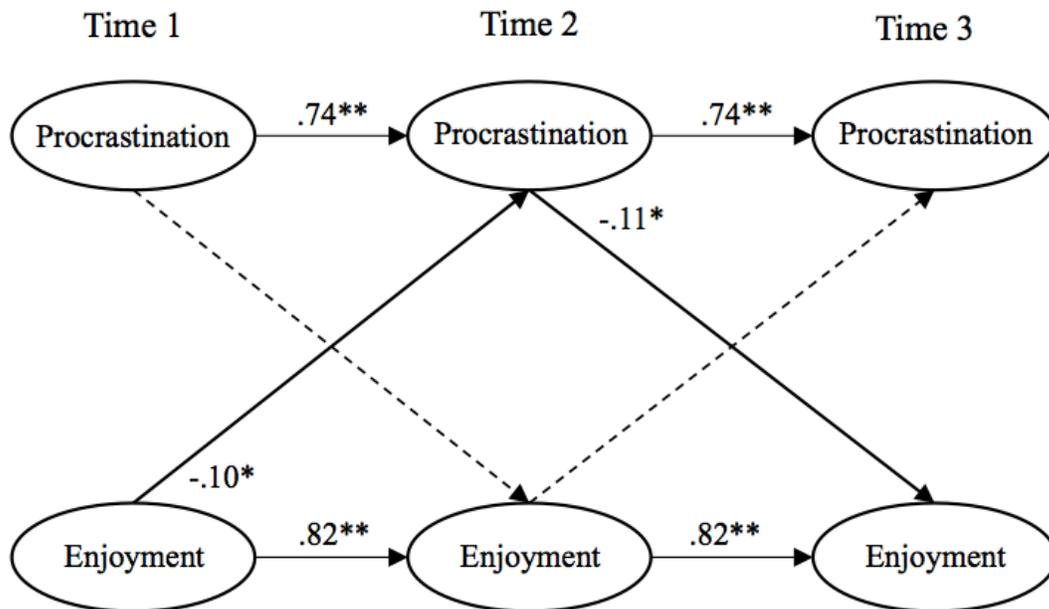
Figure A1. Cross-lagged results for procrastination and enjoyment (graduate students) with gender as a covariate. *p <.05, **p <.001.
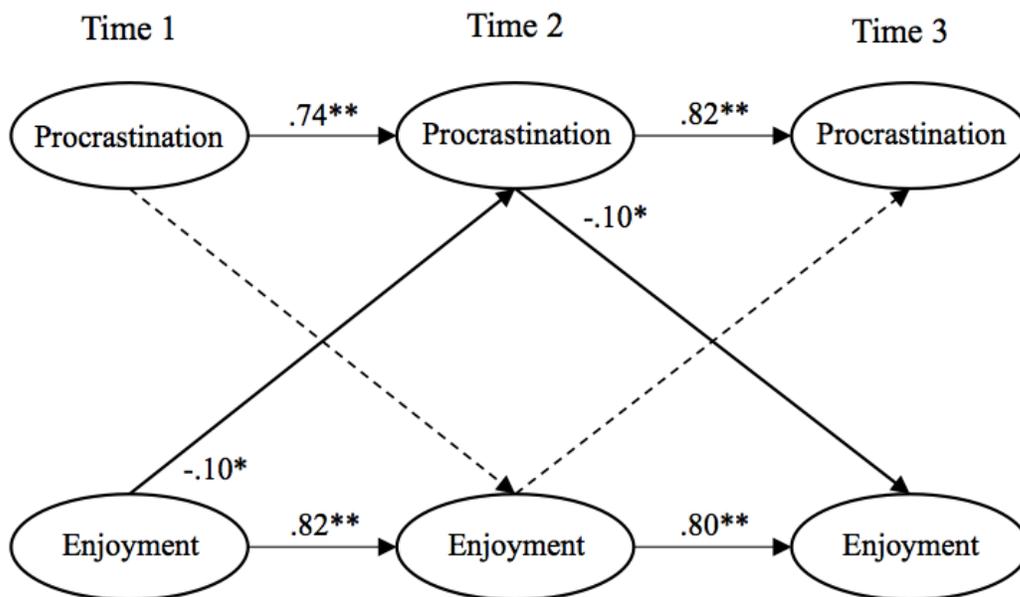

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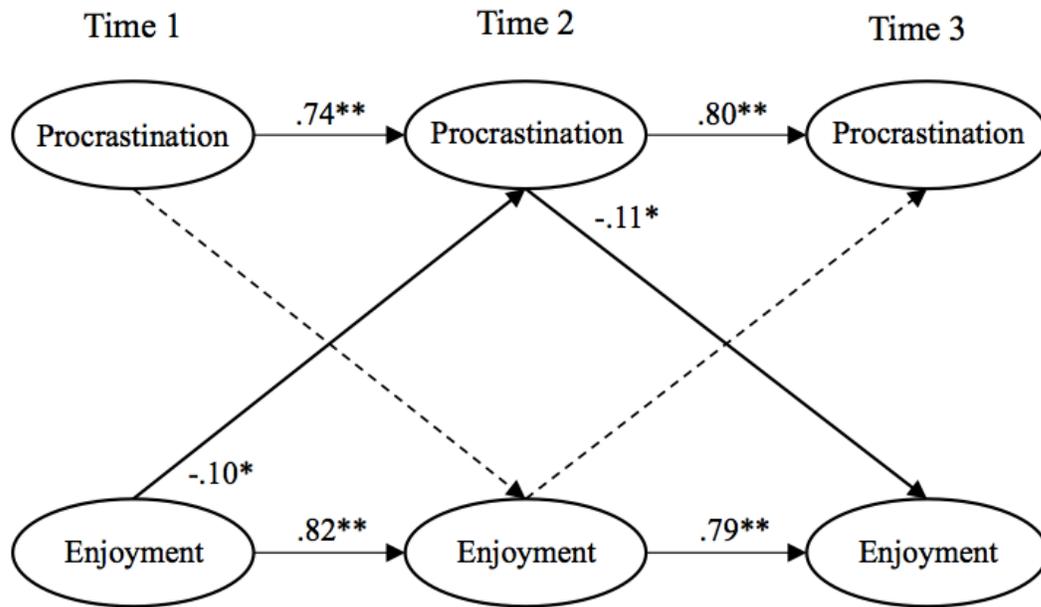
*Figure A3.* Cross-lagged results for procrastination and enjoyment (graduate students) with gender and age as covariates. *p <.05, **p <.001.
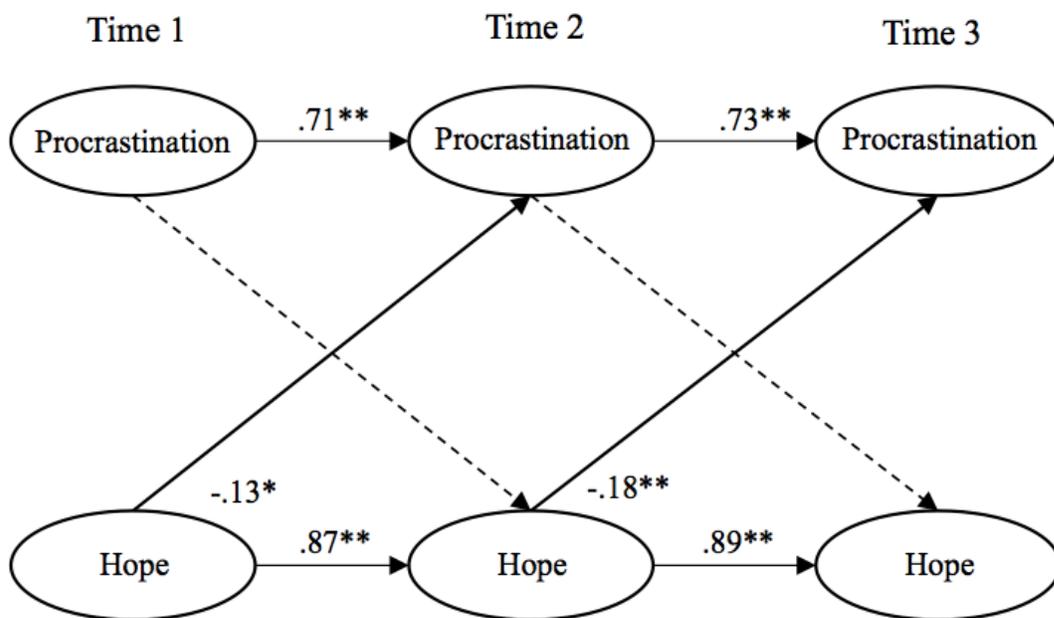

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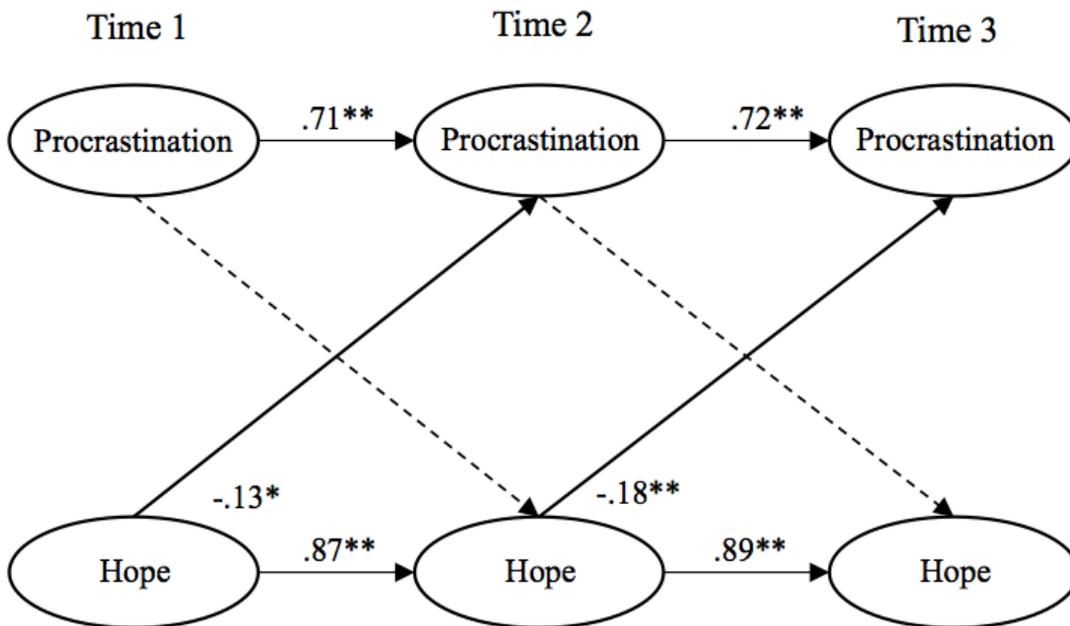
*Figure A5.* Cross-lagged results for procrastination and hope (graduate students) with age as a covariate. *p* <.05, **p* <.001.
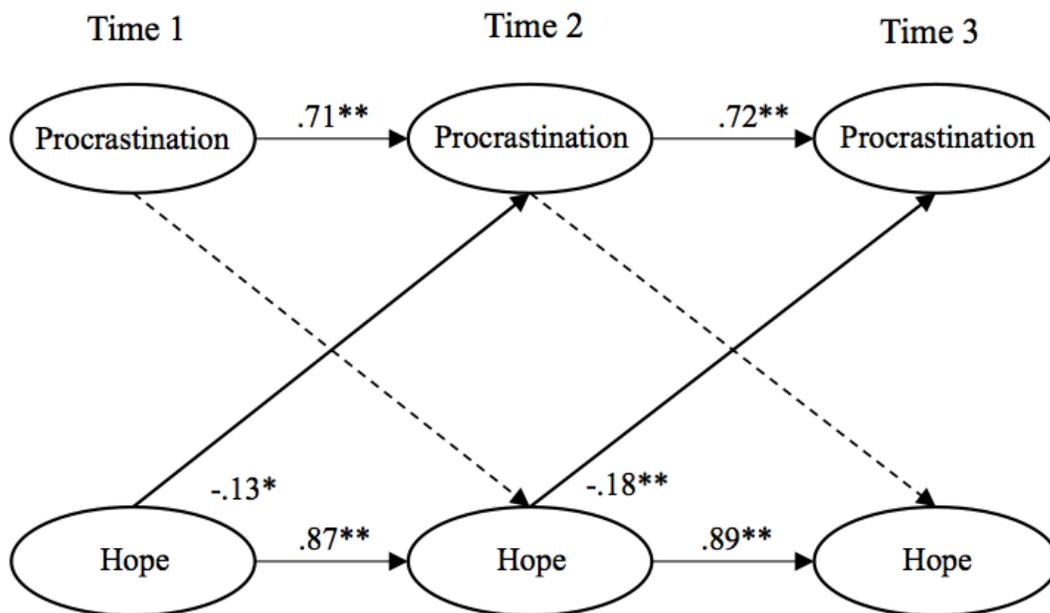
Figure A6. Cross-lagged results for procrastination and hope (graduate students) with gender and age as covariates. *p* <.05, **p* <.001.
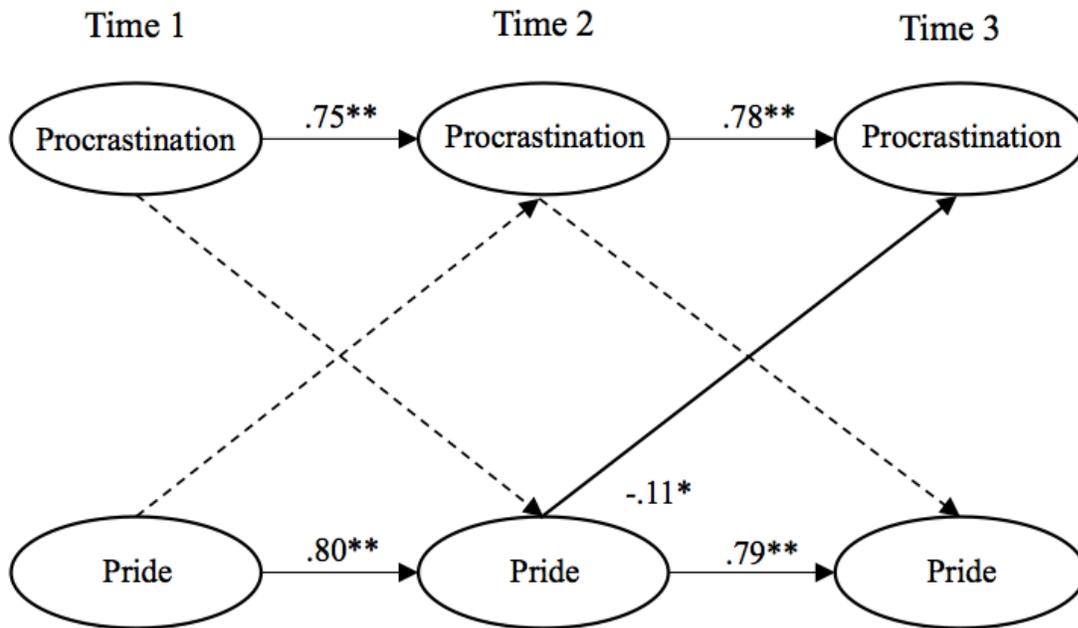
Figure A7. Cross-lagged results for procrastination and pride (graduate students) with gender as a covariate. *p <.05, **p <.001.
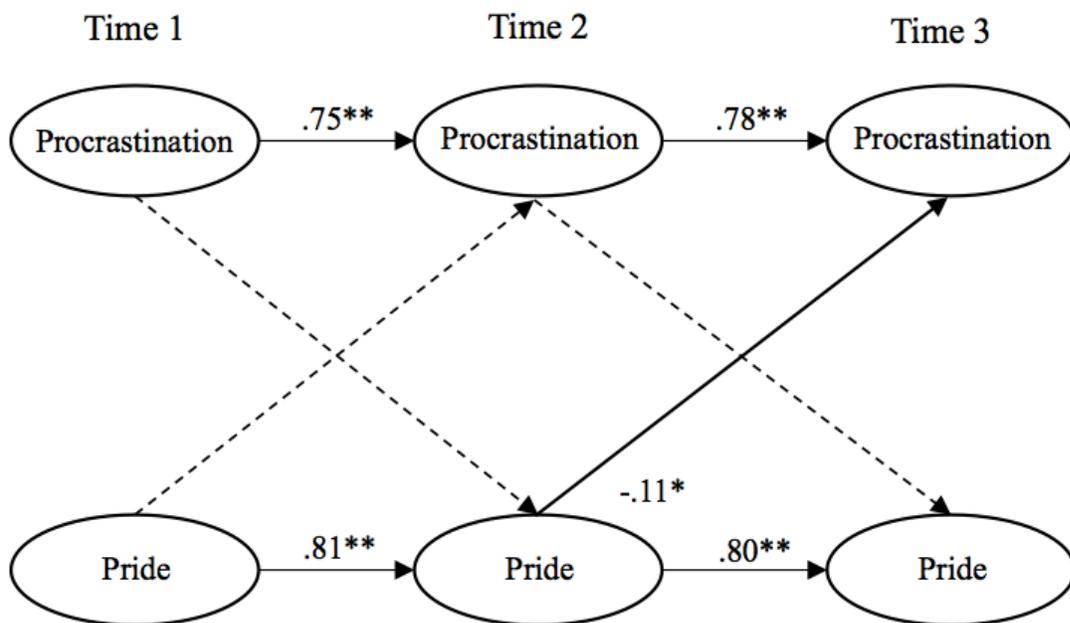

Figure A8. Cross-lagged results for procrastination and pride (graduate students) with age as a covariate. *p <.05, **p <.001.
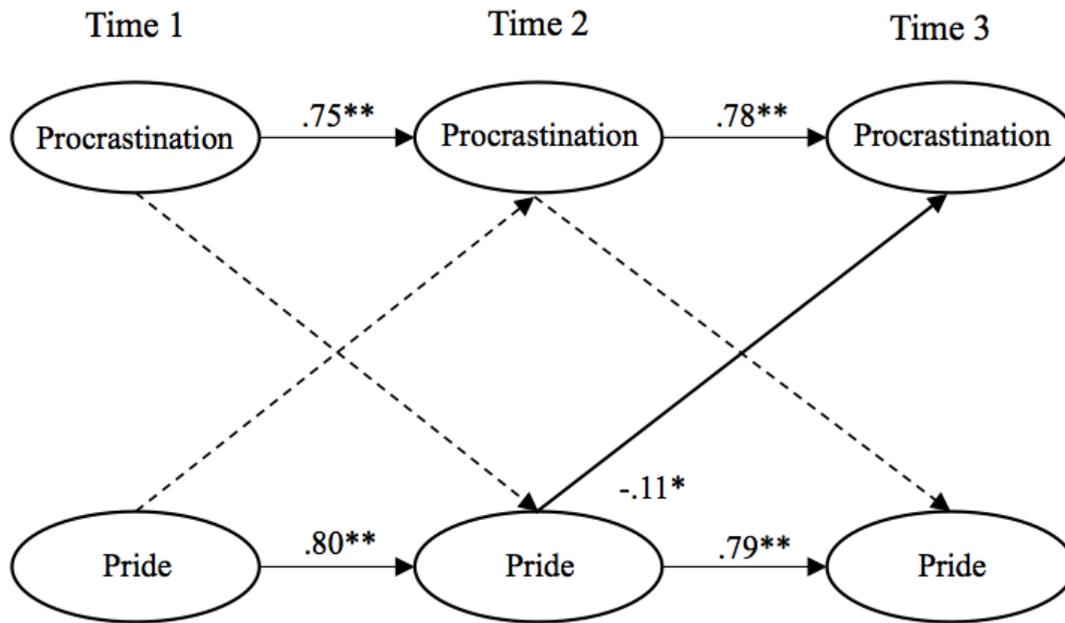
Figure A9. Cross-lagged results for procrastination and pride (graduate students) with gender and age as covariates. *p <.05, **p <.001.
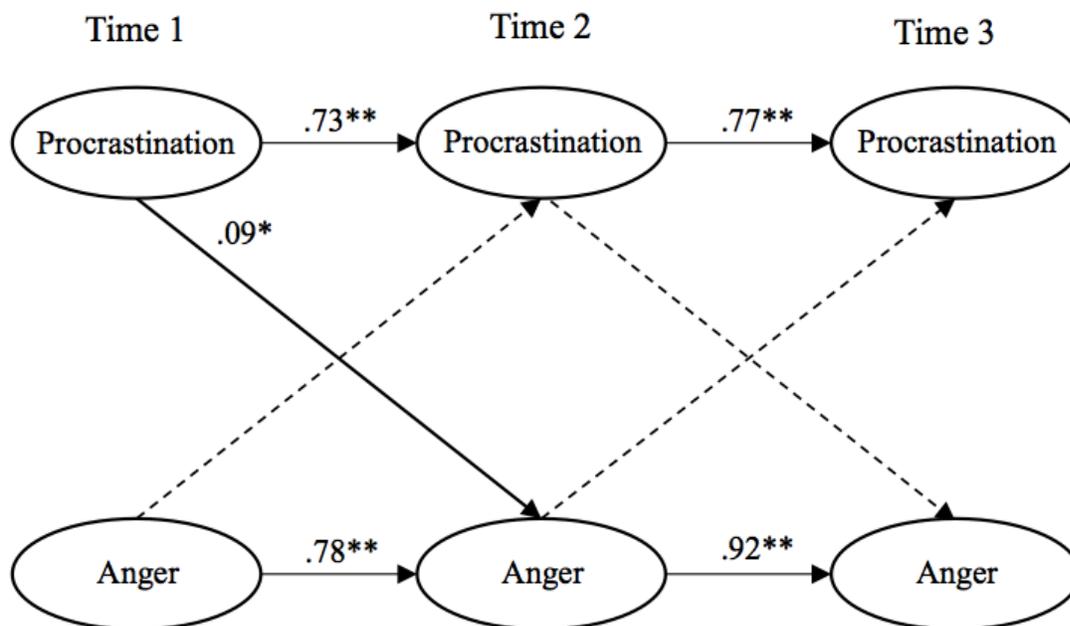
*Figure A10.* Cross-lagged results for procrastination and anger (graduate students) with gender as a covariate. *p <.05, **p <.001.
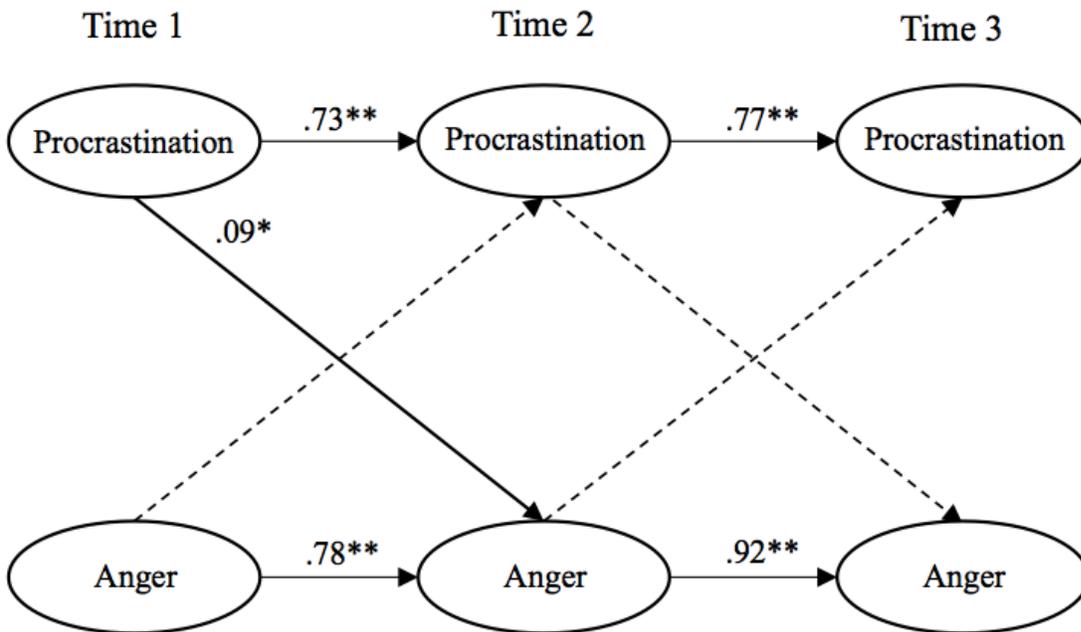
*Figure A11.* Cross-lagged results for procrastination and anger (graduate students) with age as a covariate. *p <.05, **p <.001.
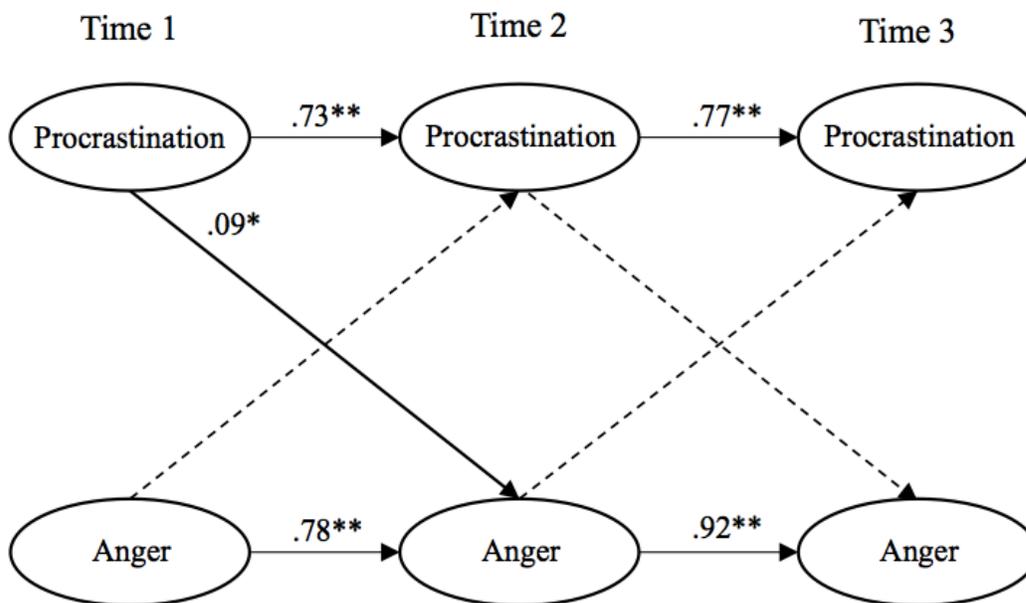
Figure A12. Cross-lagged results for procrastination and anger (graduate students) with gender and age as covariates. *p <.05, **p <.001.
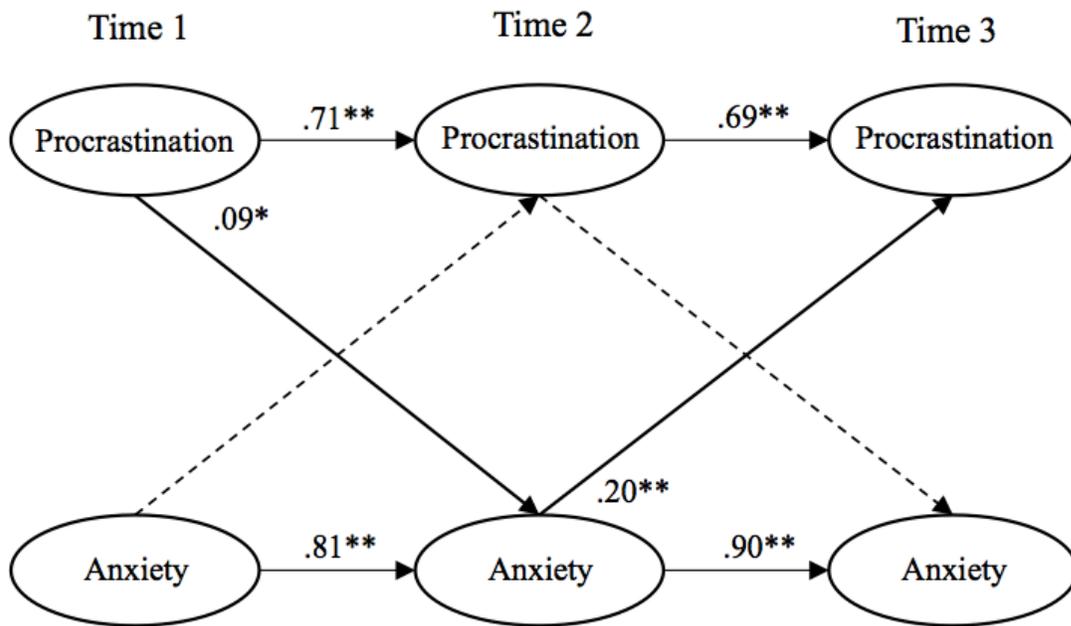
Figure A13. Cross-lagged results for procrastination and anxiety (graduate students) with gender as a covariate. *p <.05, **p <.001.
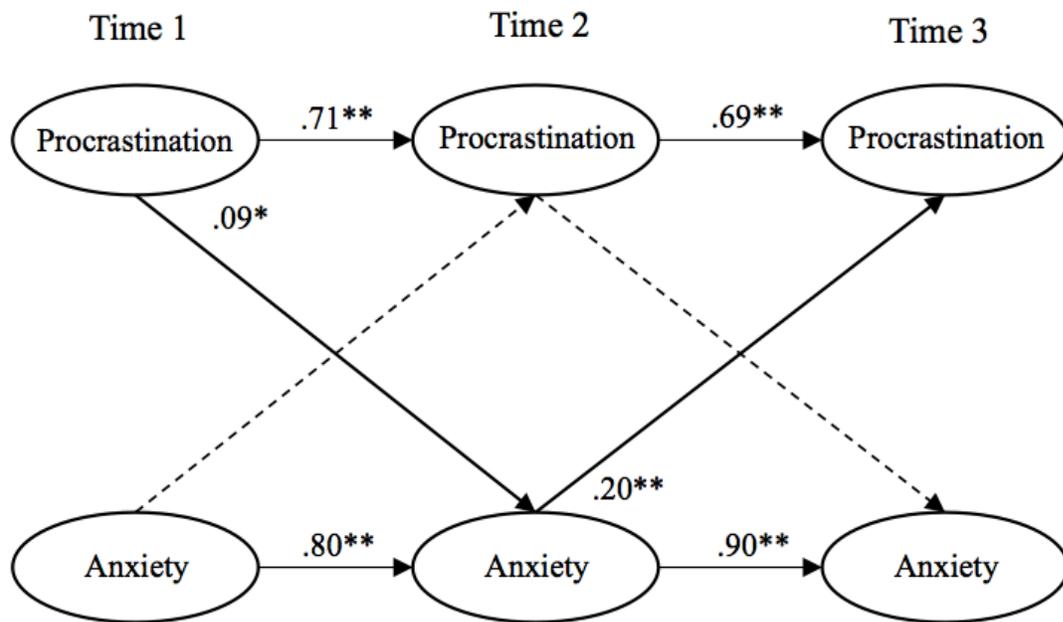

Figure A14. Cross-lagged results for procrastination and anxiety (graduate students) with age as a covariate. *p <.05, **p <.001.
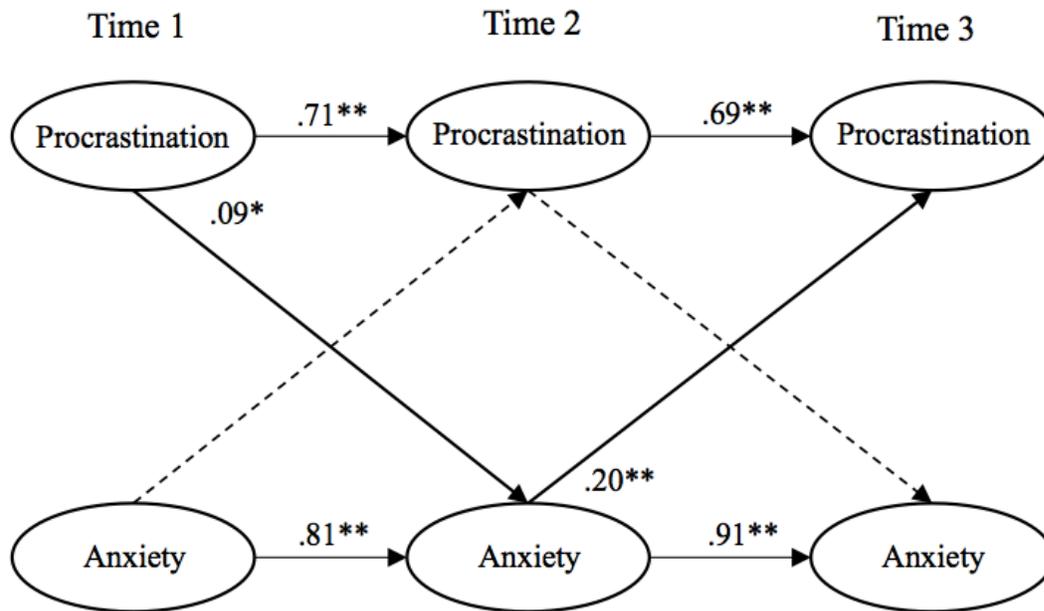
Figure A15. Cross-lagged results for procrastination and anxiety (graduate students) with gender

and age as covariates. *p <.05, **p <.001.
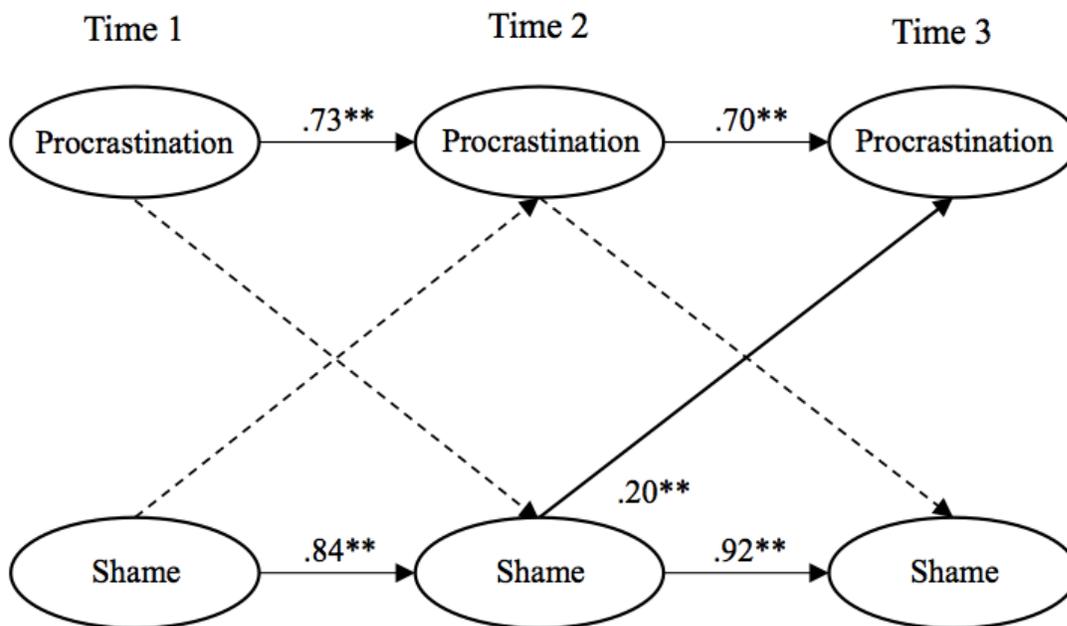
Figure A16. Cross-lagged results for procrastination and shame (graduate students) with gender

as a covariate. *p <.05, **p <.001.
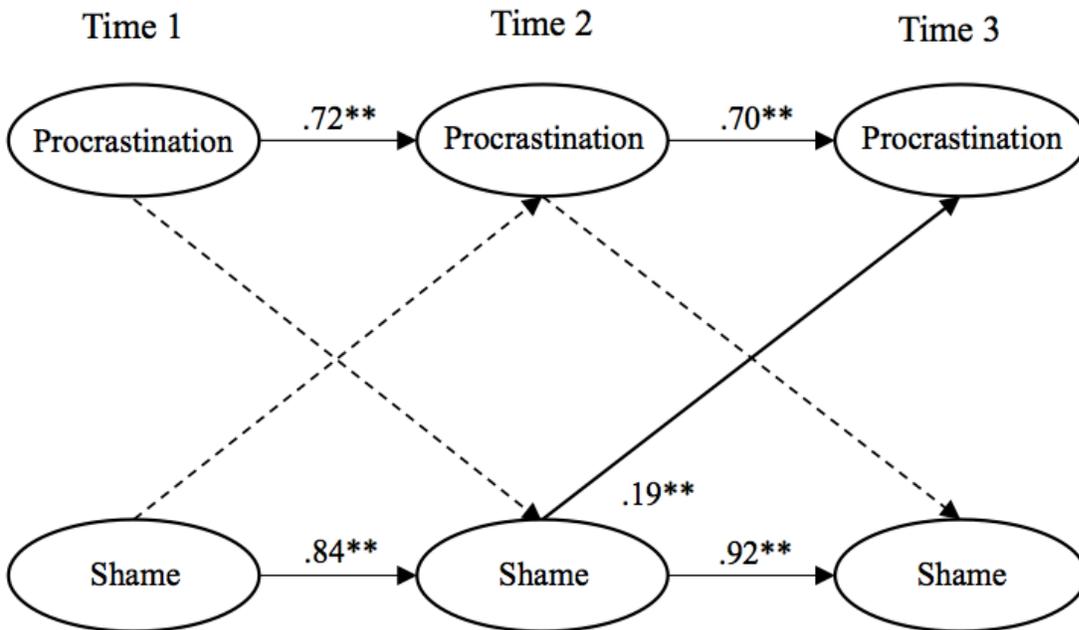
Figure A17. Cross-lagged results for procrastination and shame (graduate students) with age as a
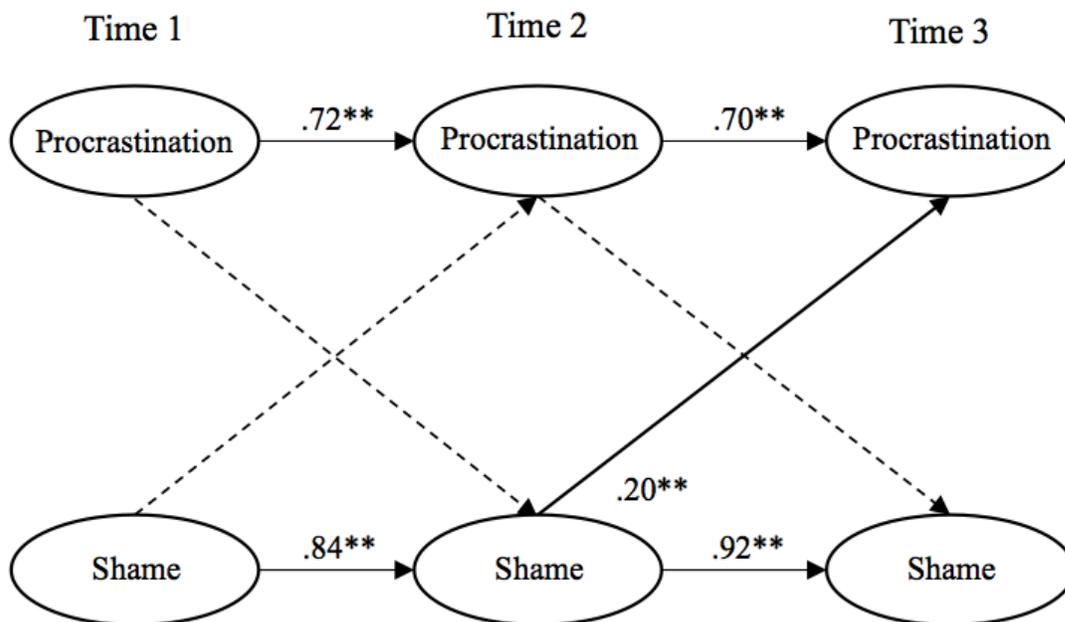
covariate. *p <.05, **p <.001.

Figure A18. Cross-lagged results for procrastination and shame (graduate students) with gender

and age as covariates. *p <.05, **p <.001.
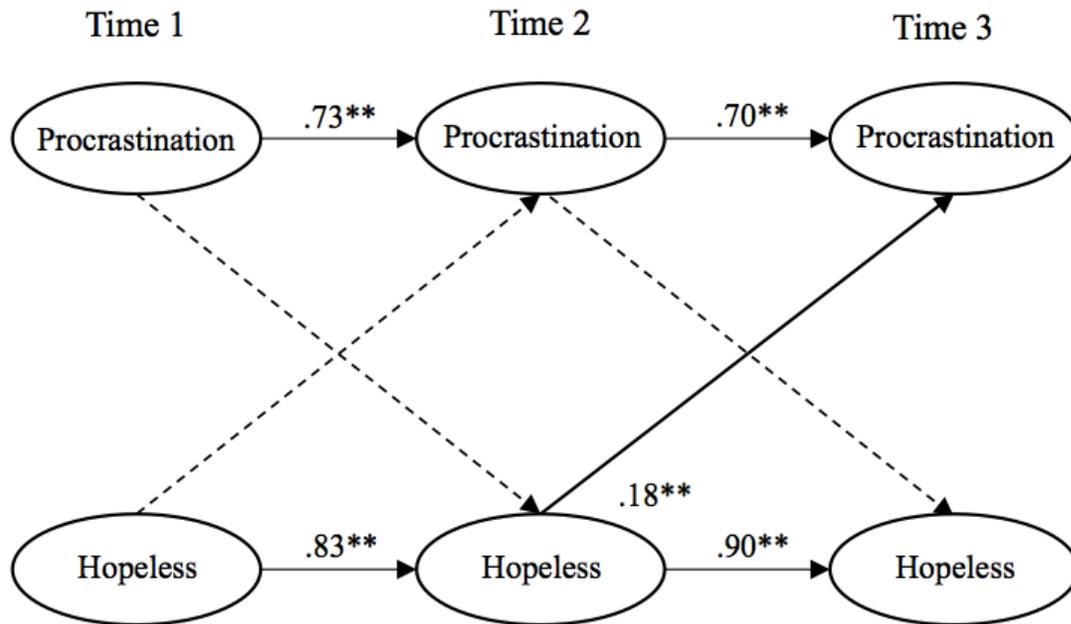
Figure A19. Cross-lagged results for procrastination and hopelessness (graduate students) with gender as a covariate. *p <.05, **p <.001.
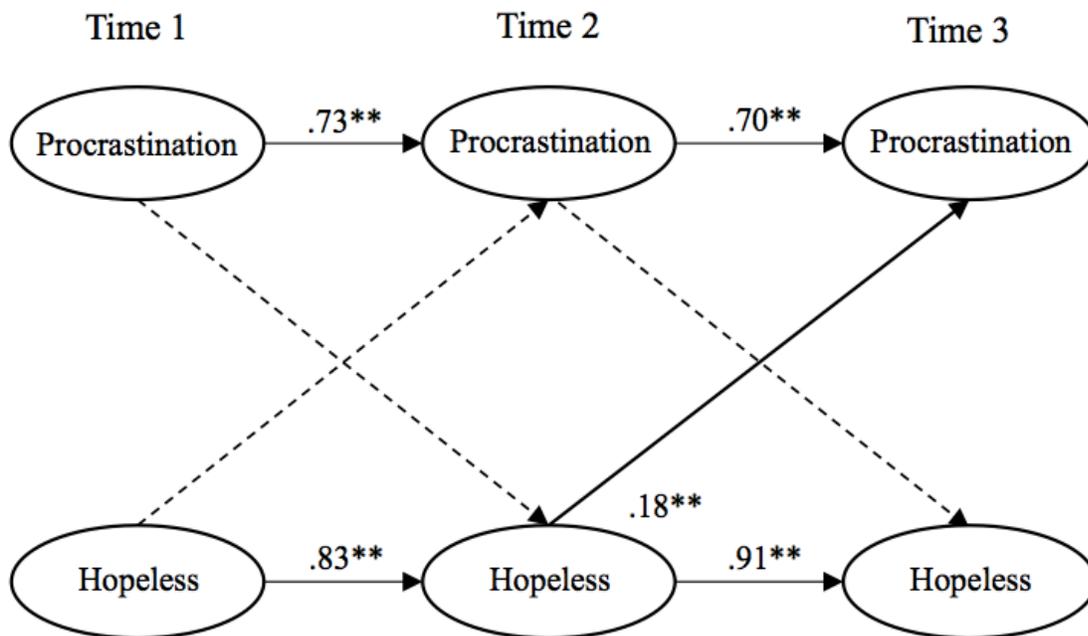

Figure A20. Cross-lagged results for procrastination and hopelessness (graduate students) with age as a covariate. *p <.05, **p <.001.
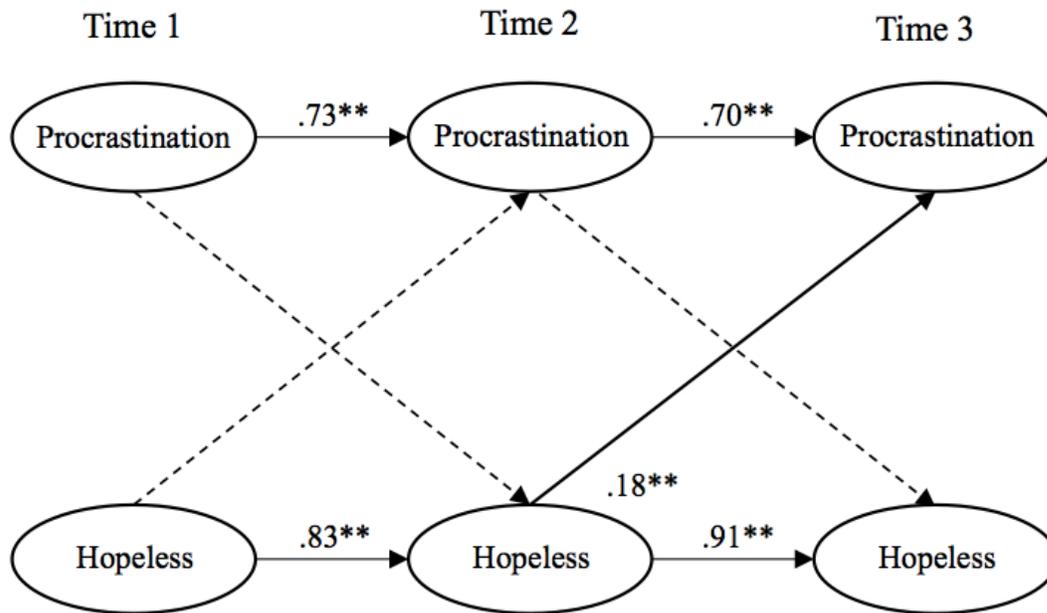
*Figure A21.* Cross-lagged results for procrastination and hopelessness (graduate students) with gender and age as covariates. *p <.05, **p <.001.
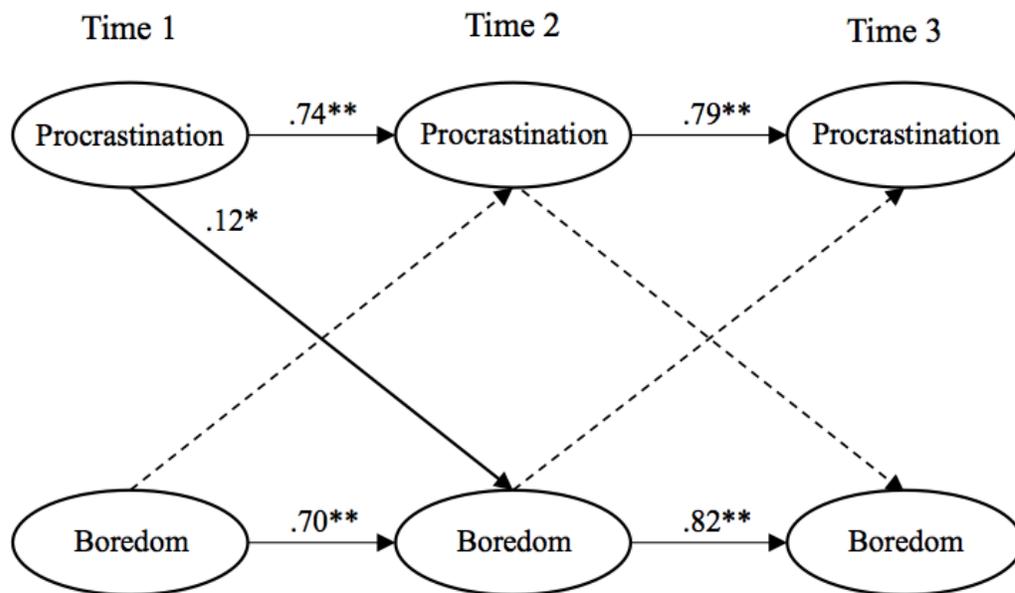

Figure A22. Cross-lagged results for procrastination and boredom (graduate students) with gender as a covariate. *p <.05, **p <.001.
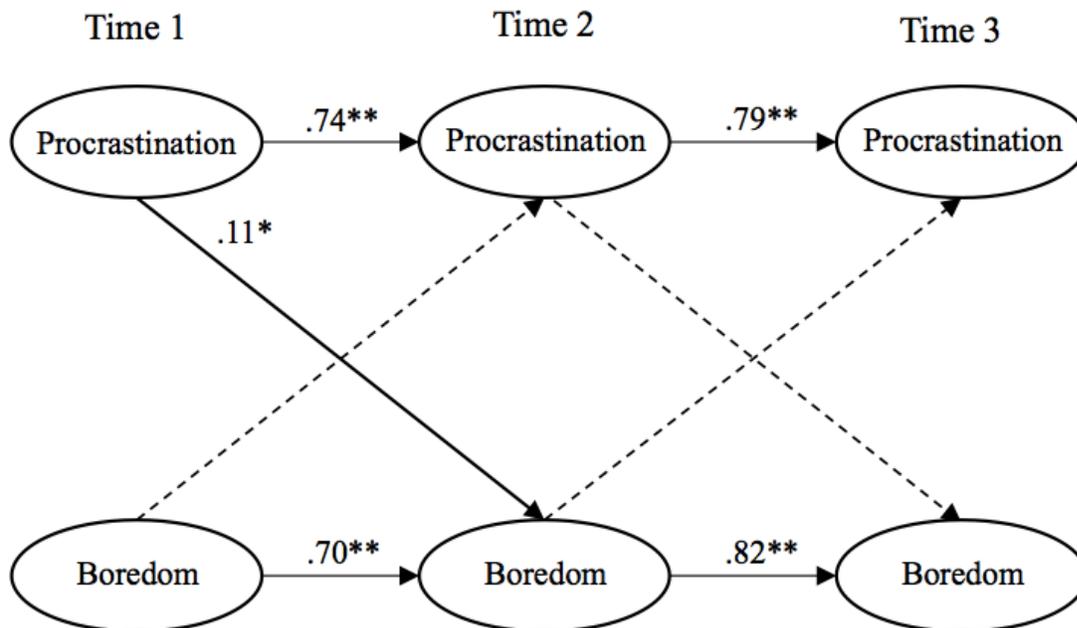
Figure A23. Cross-lagged results for procrastination and boredom (graduate students) with age as a covariate. *p <.05, **p <.001.
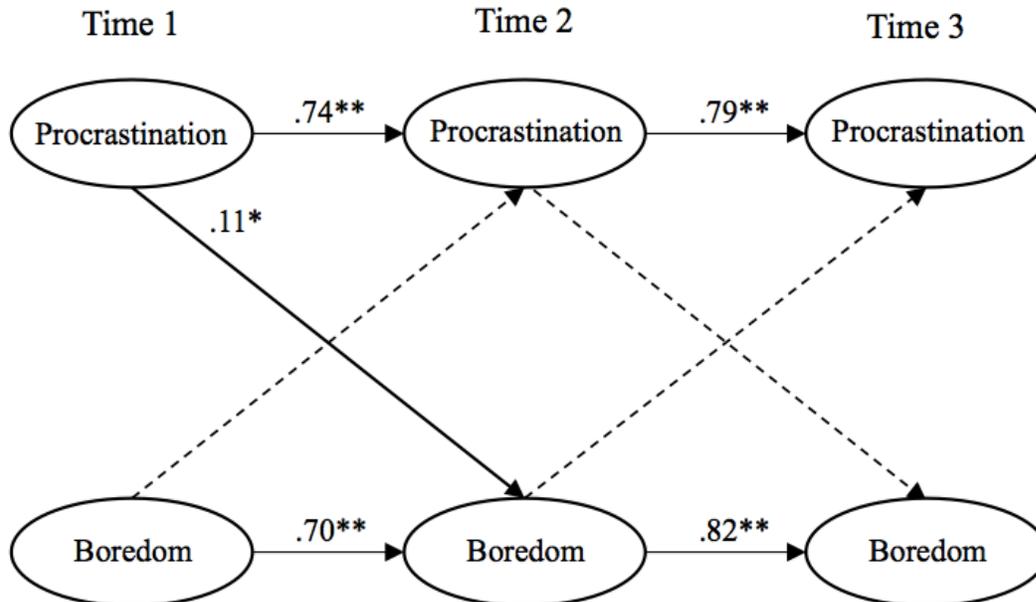
Figure A24. Cross-lagged results for procrastination and boredom (graduate students) with gender and age as covariates. *p <.05, **p <.001.
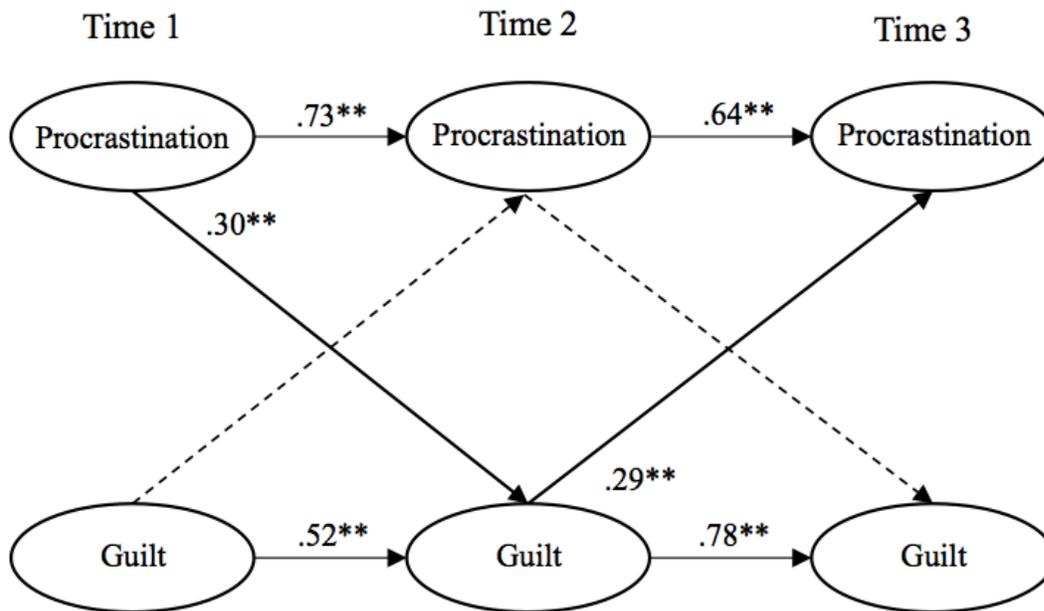
Figure A25. Cross-lagged results for procrastination and guilt (graduate students) with gender as a covariate. *p <.05, **p <.001.
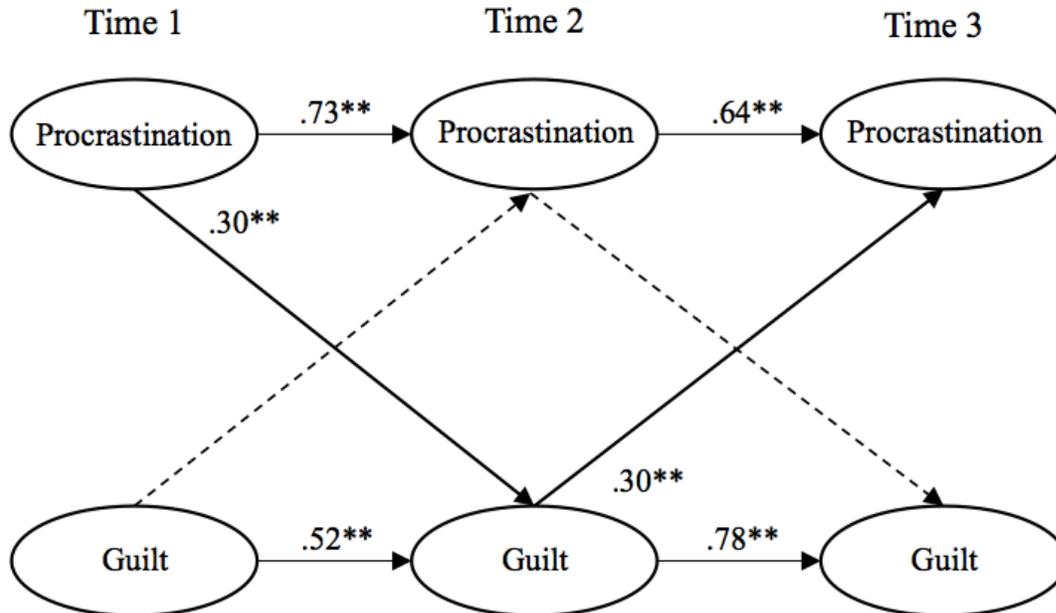

Figure A26. Cross-lagged results for procrastination and guilt (graduate students) with age as a covariate. *p <.05, **p <.001.
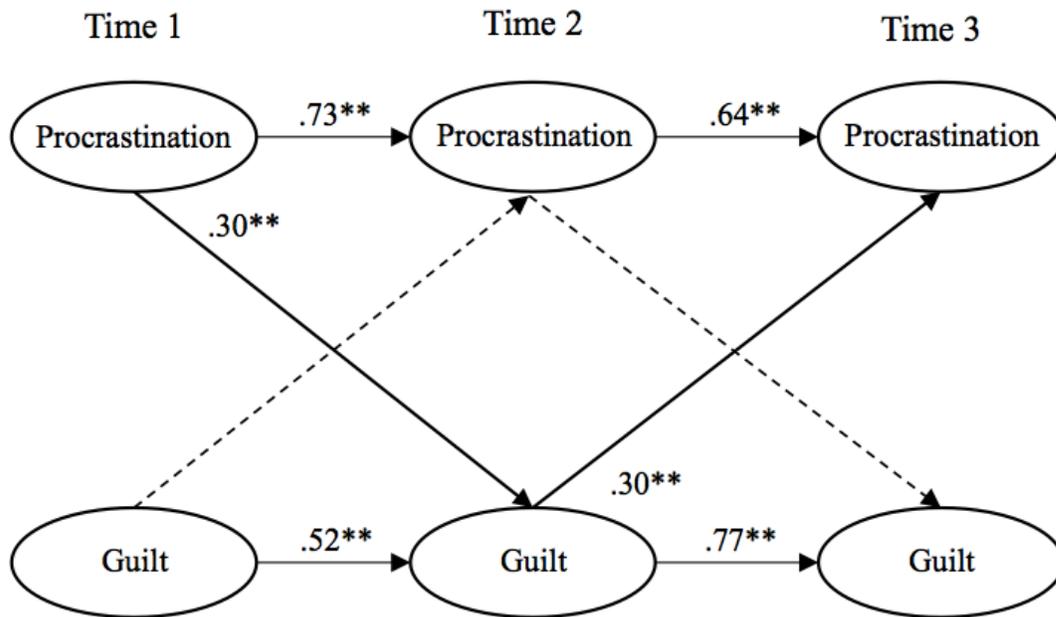
Figure A27. Cross-lagged results for procrastination and guilt (graduate students) with gender

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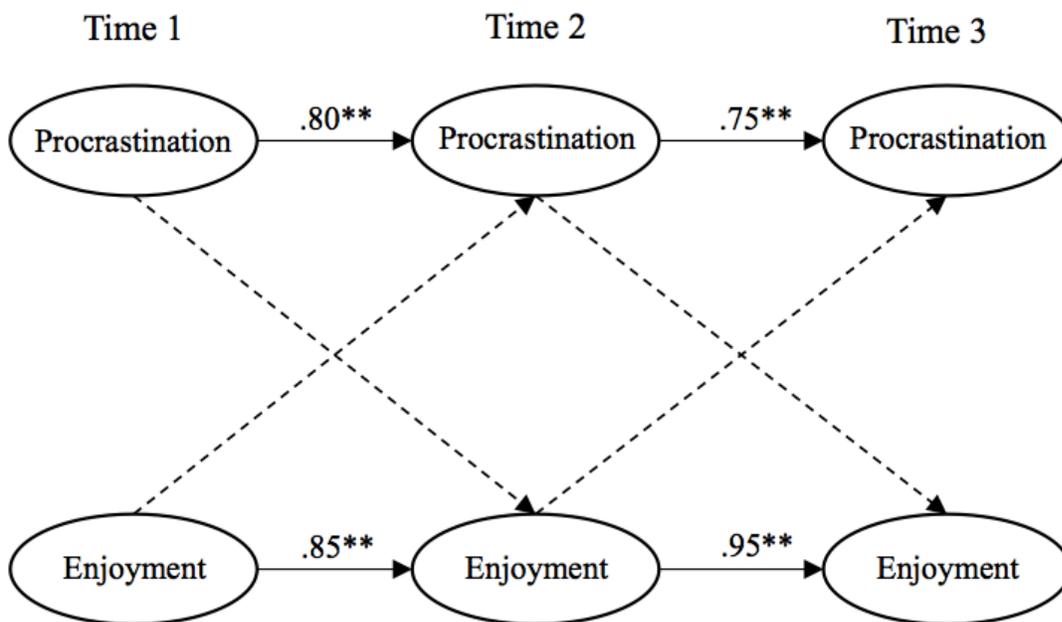
Figure A28. Cross-lagged results for procrastination and enjoyment (undergraduate students)

with gender as a covariate. *p <.05, **p <.001.
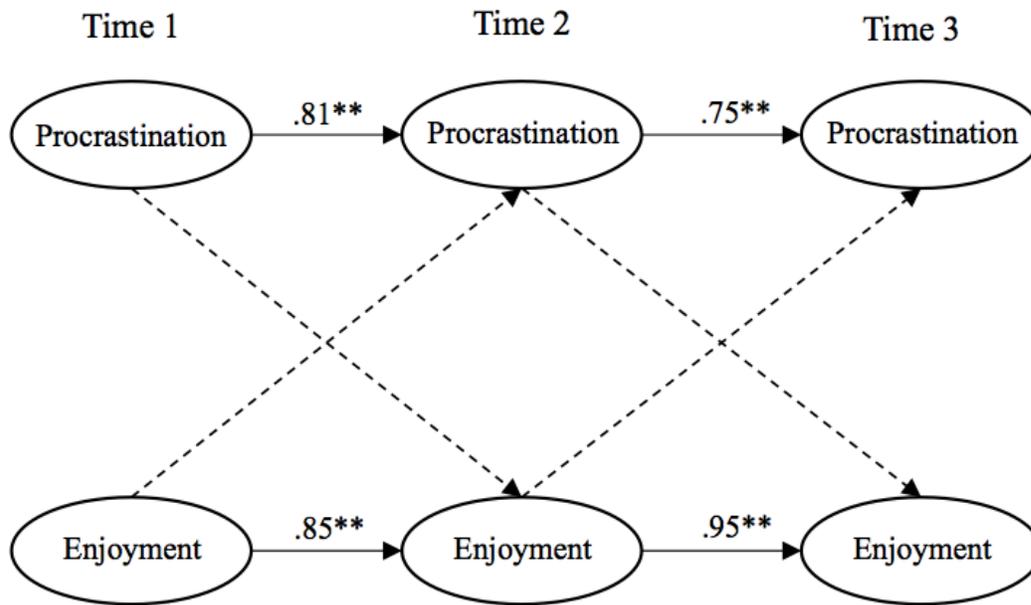
*Figure A29.* Cross-lagged results for procrastination and enjoyment (undergraduate students) with age as a covariate. *p <.05, **p <.001.
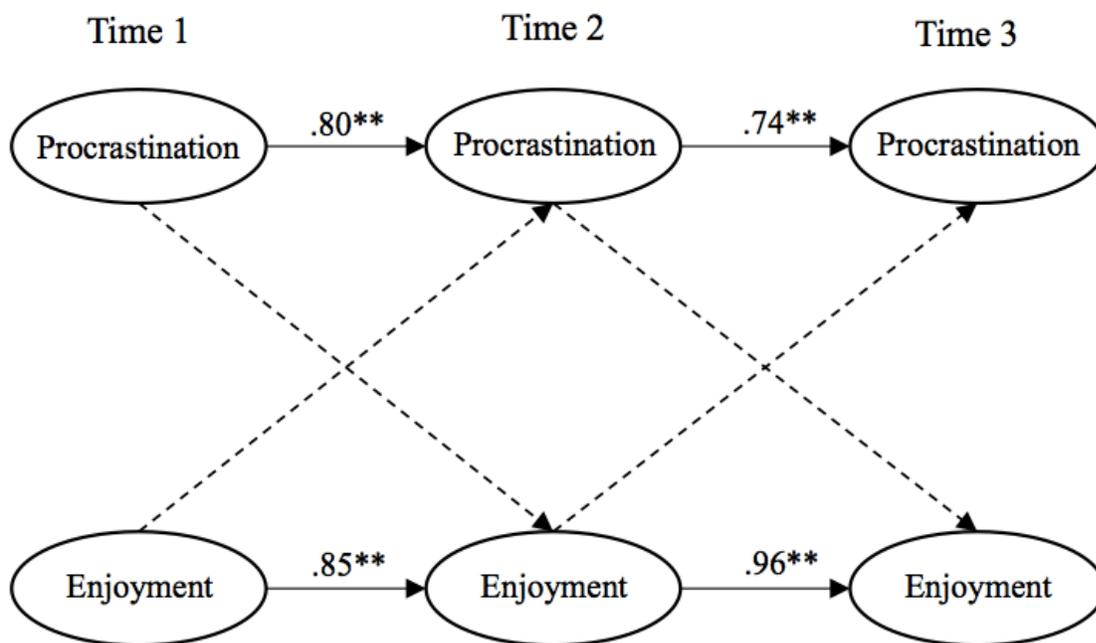
Figure A30. Cross-lagged results for procrastination and enjoyment (undergraduate students) with gender and age as covariates. *p <.05, **p <.001.
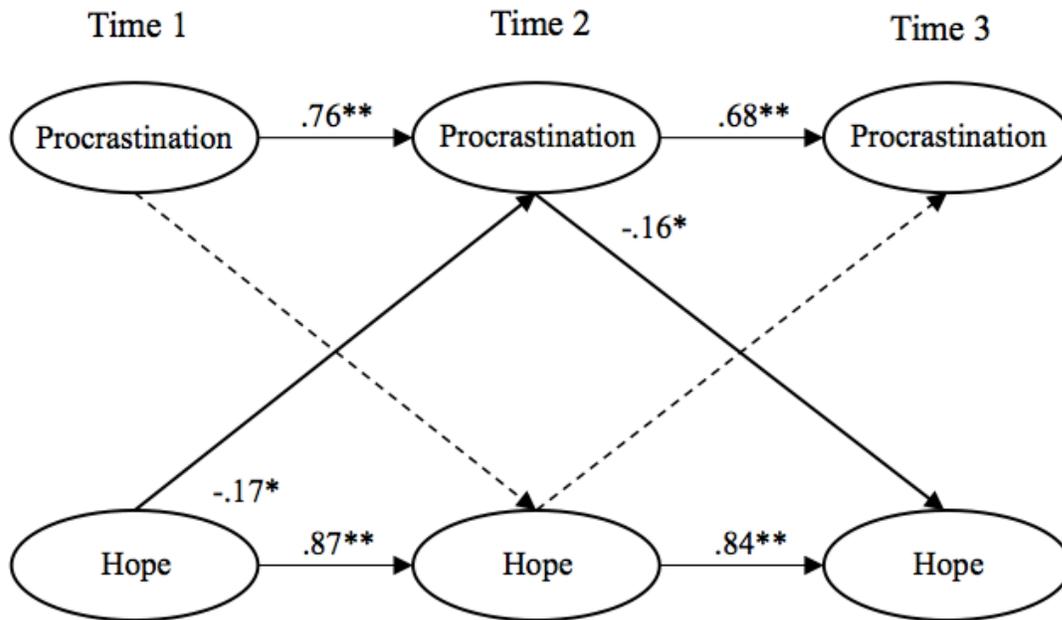
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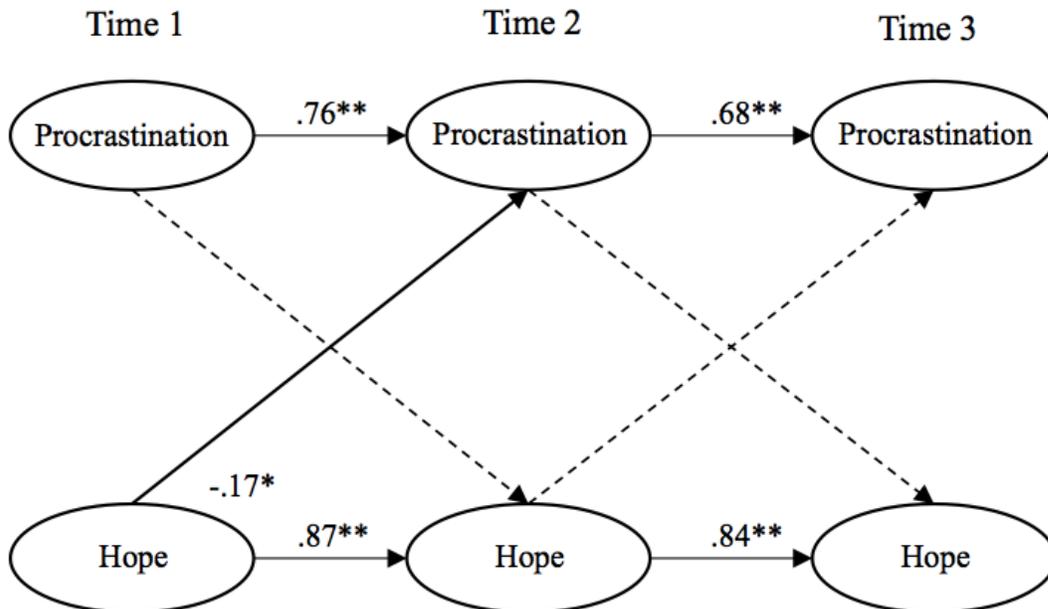

Figure A32. Cross-lagged results for procrastination and hope (undergraduate students) with age as a covariate. *p* <.05, **p* <.001.
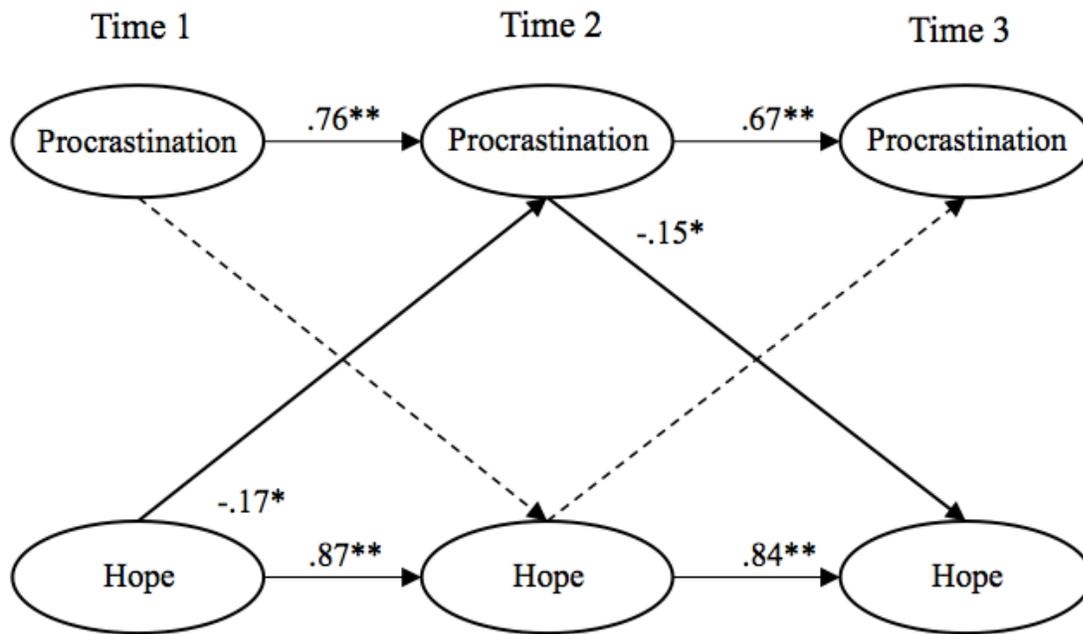
*Figure A33.* Cross-lagged results for procrastination and hope (undergraduate students) with gender and age as covariates. *p < .05, **p < .001.
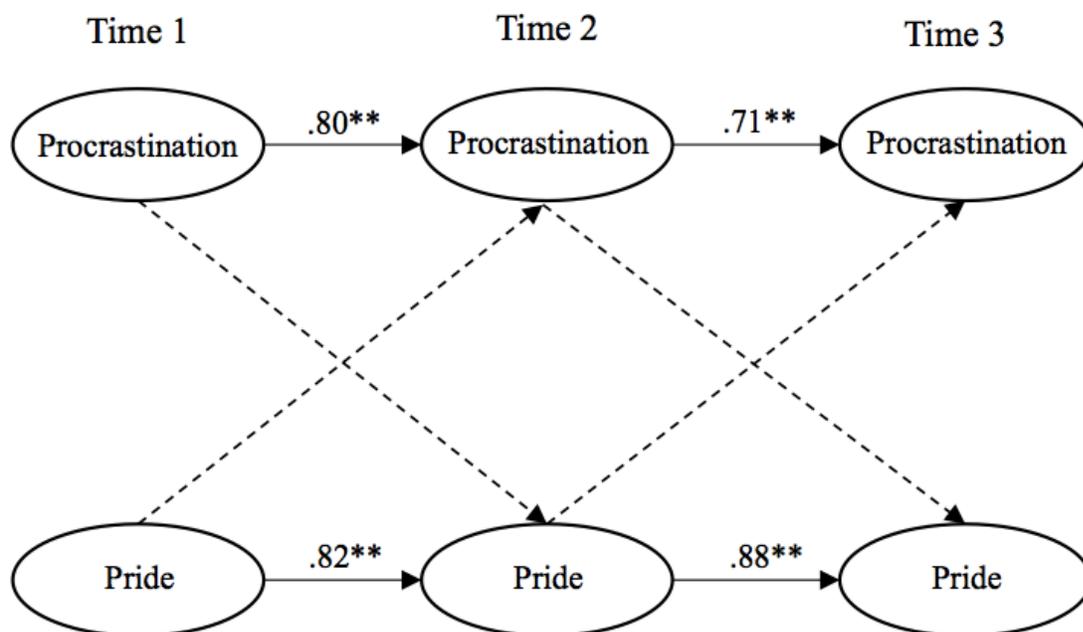
Figure A34. Cross-lagged results for procrastination and pride (undergraduate students) with gender as a covariate. *p < .05, **p < .001.
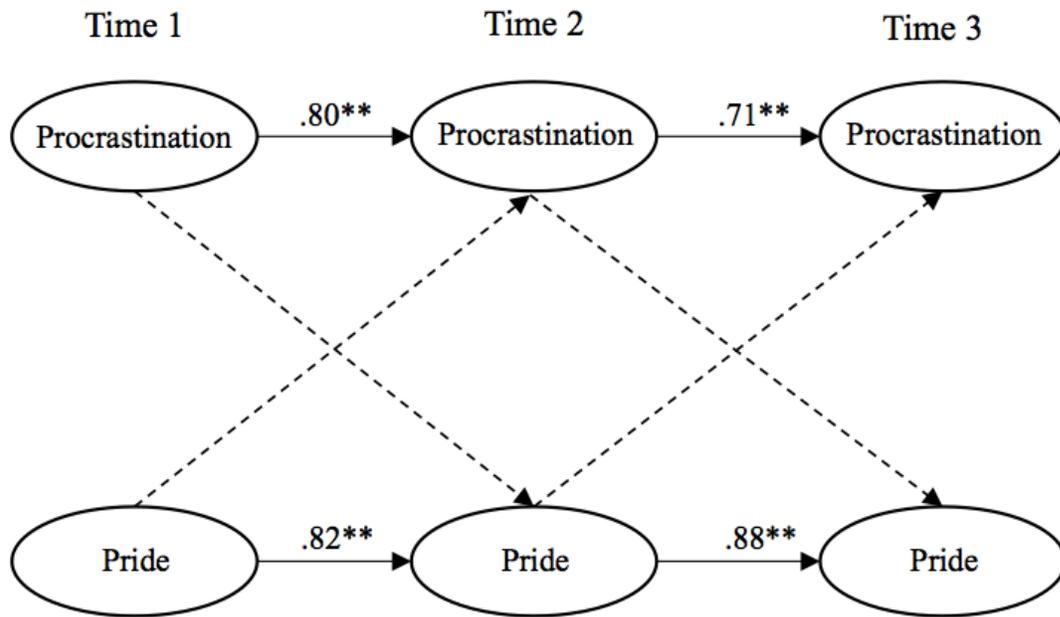
Figure A35. Cross-lagged results for procrastination and pride (undergraduate students) with age as a covariate. *p* <.05, **p* <.001
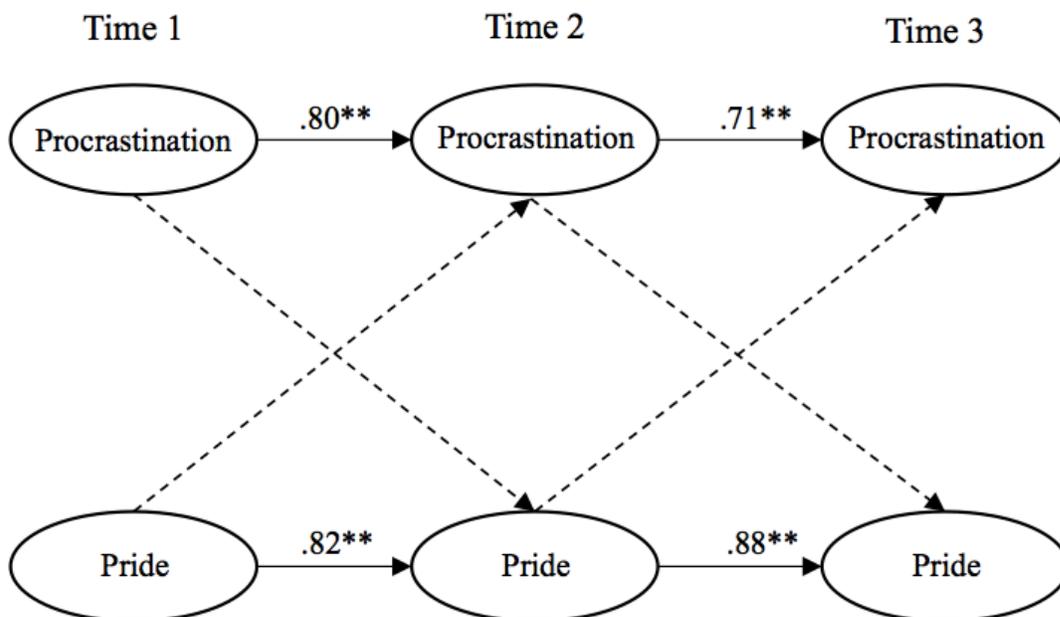
Figure A36. Cross-lagged results for procrastination and pride (undergraduate students) with gender and age as covariates. *p* <.05, **p* <.001.
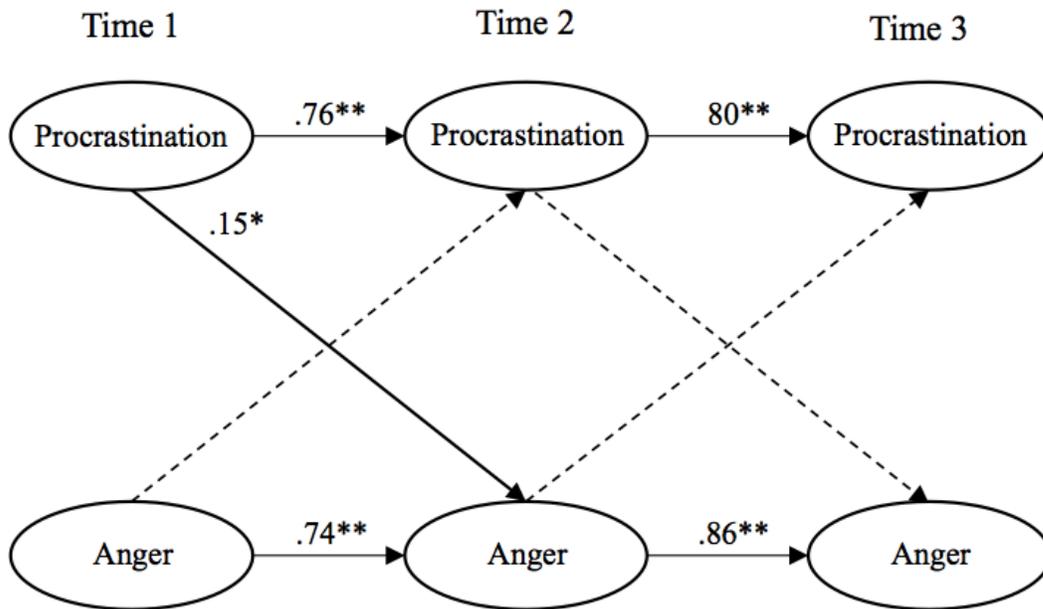
*Figure A37.* Cross-lagged results for procrastination and anger (undergraduate students) with gender as a covariate. *p* <.05, **p* <.001.
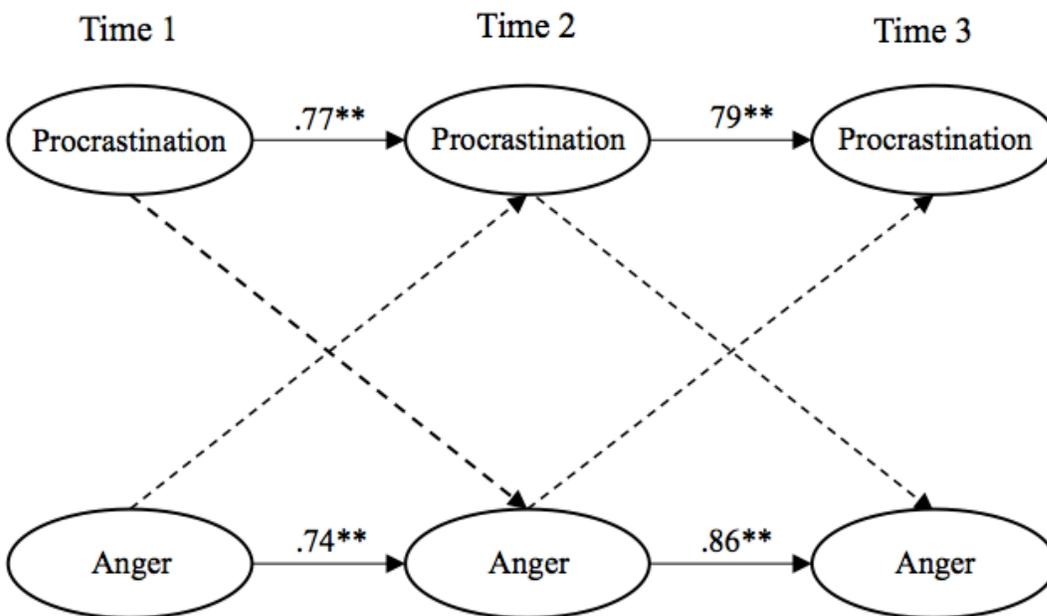

*Figure A38.* Cross-lagged results for procrastination and anger (undergraduate students) with age as a covariate. *p* <.05, **p* <.001.
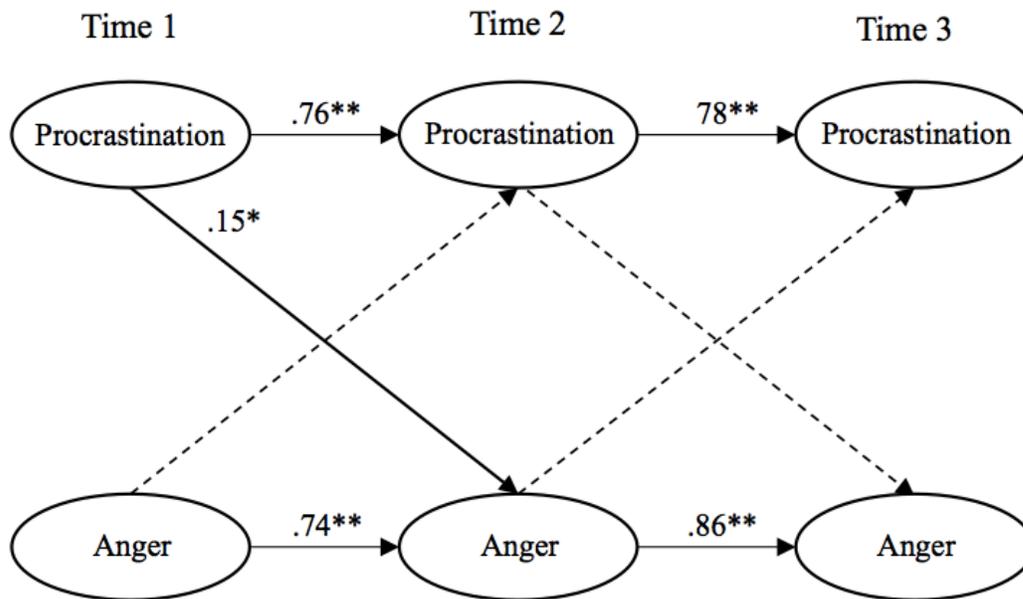
Figure A39. Cross-lagged results for procrastination and anger (undergraduate students) with gender and age as covariates. *p <.05, **p <.001.
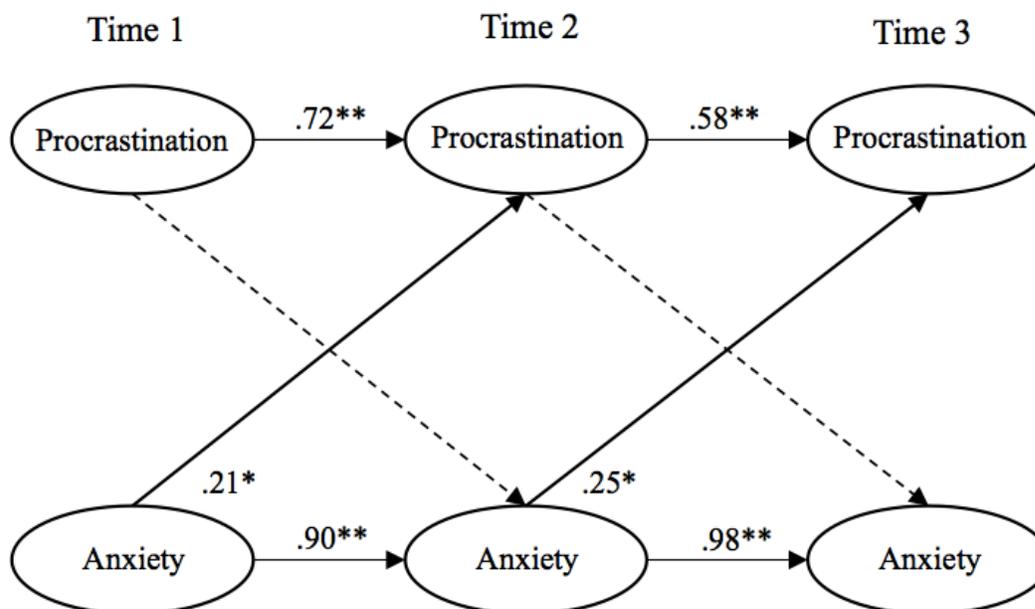
Figure A40. Cross-lagged results for procrastination and anxiety (undergraduate students) with gender as a covariate. *p <.05, **p <.001.
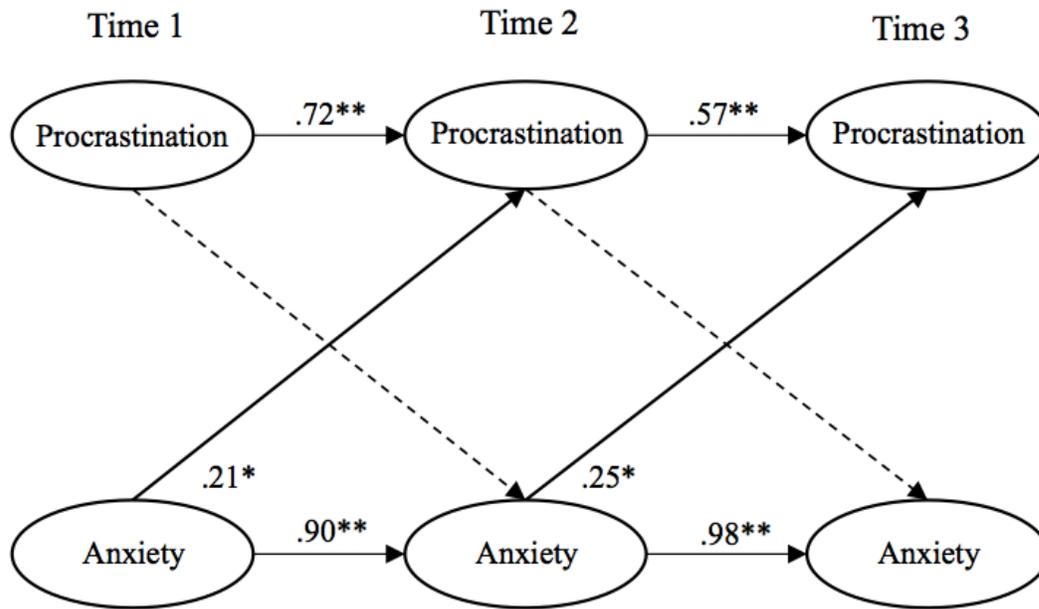
Figure A41. Cross-lagged results for procrastination and anxiety (undergraduate students) with age as a covariate. *p <.05, **p <.001.
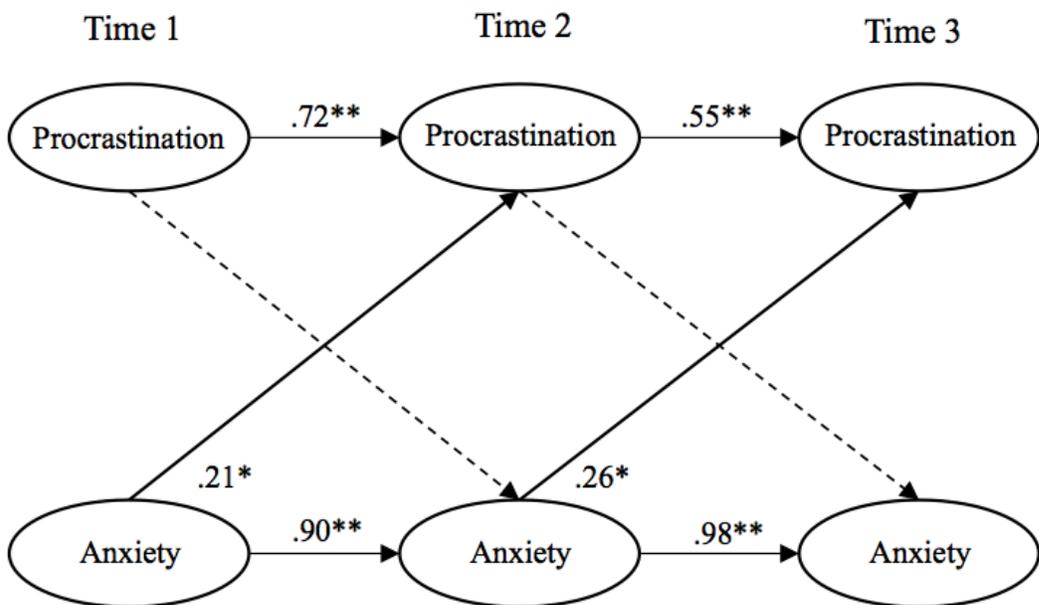
Figure A42. Cross-lagged results for procrastination and anxiety (undergraduate students) with gender and age as covariates. *p <.05, **p <.001.
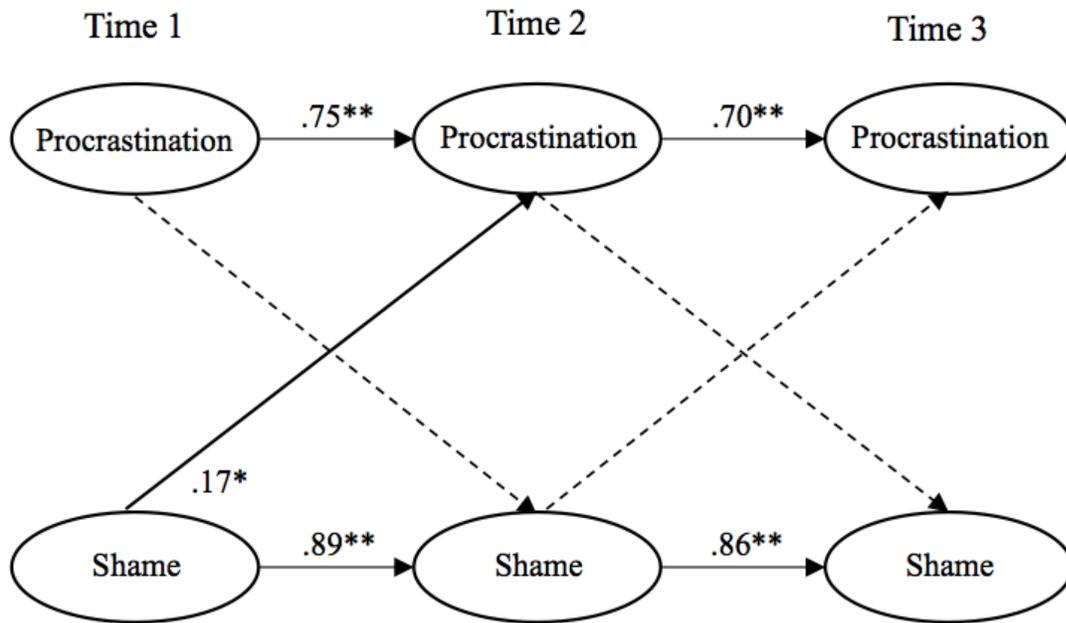
*Figure A43.* Cross-lagged results for procrastination and shame (undergraduate students) with gender as a covariate. *p* <.05, **p* <.001.
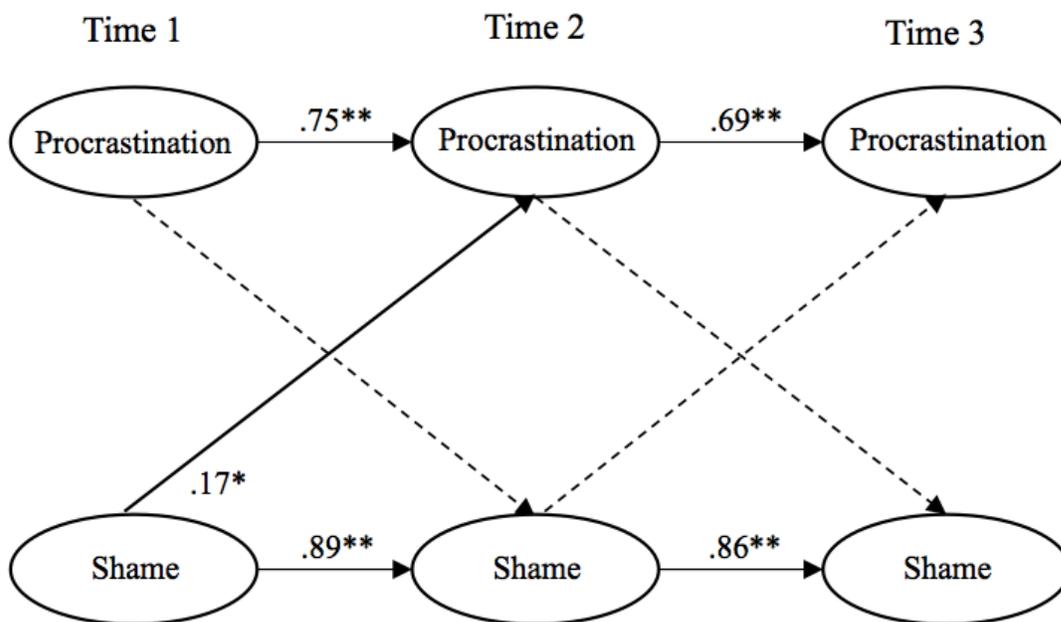
Figure A44. Cross-lagged results for procrastination and shame (undergraduate students) with age as a covariate. *p* <.05, **p* <.001.
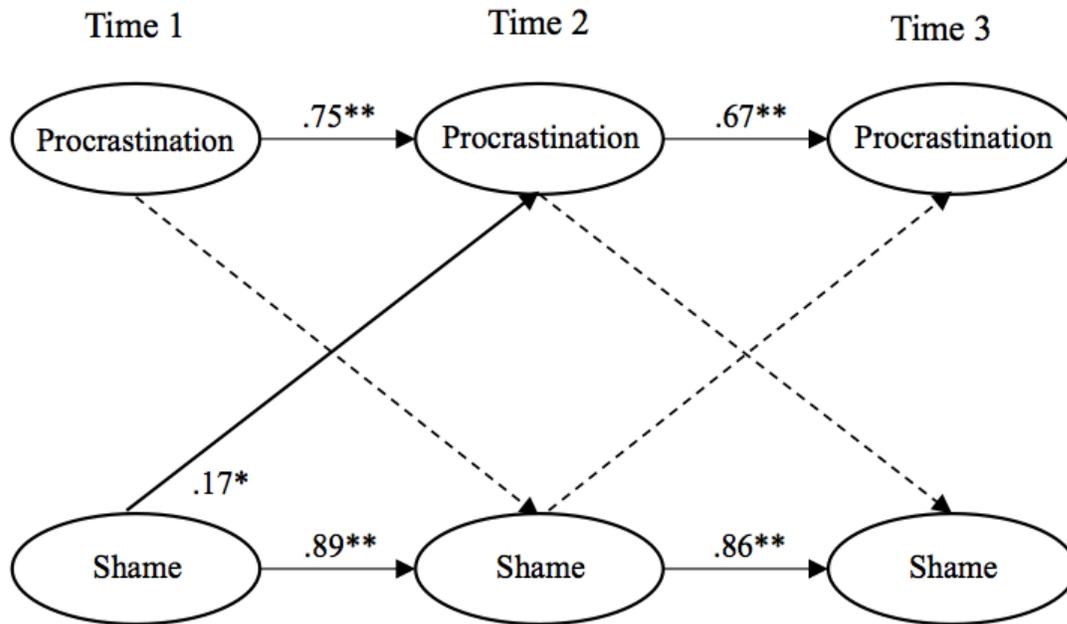
*Figure A45.* Cross-lagged results for procrastination and shame (undergraduate students) with gender and age as covariates. *p <.05, **p <.001.
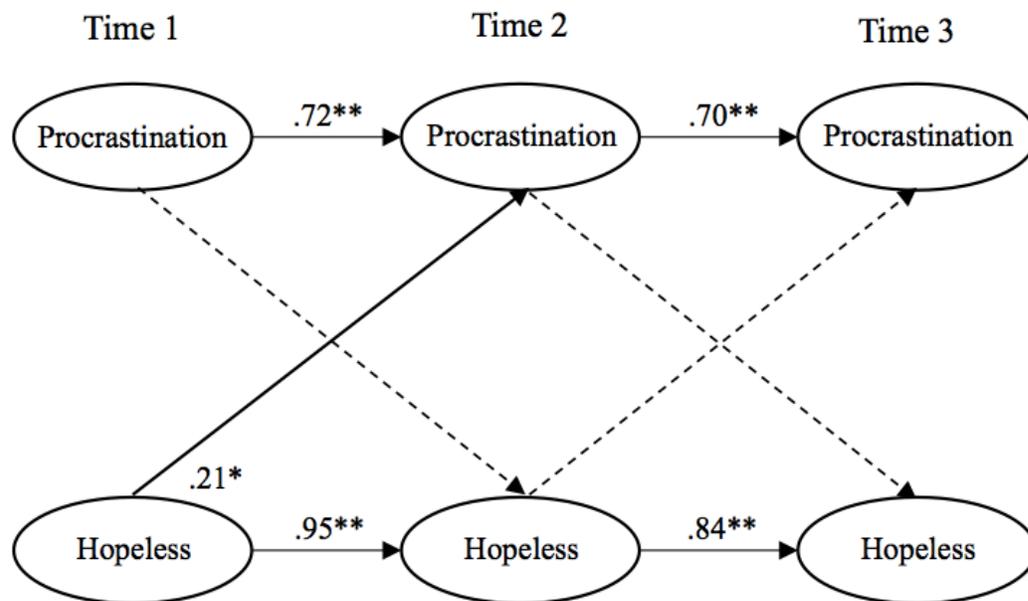
Figure A46. Cross-lagged results for procrastination and hopelessness (undergraduate students) with gender as a covariate. *p <.05, **p <.001.
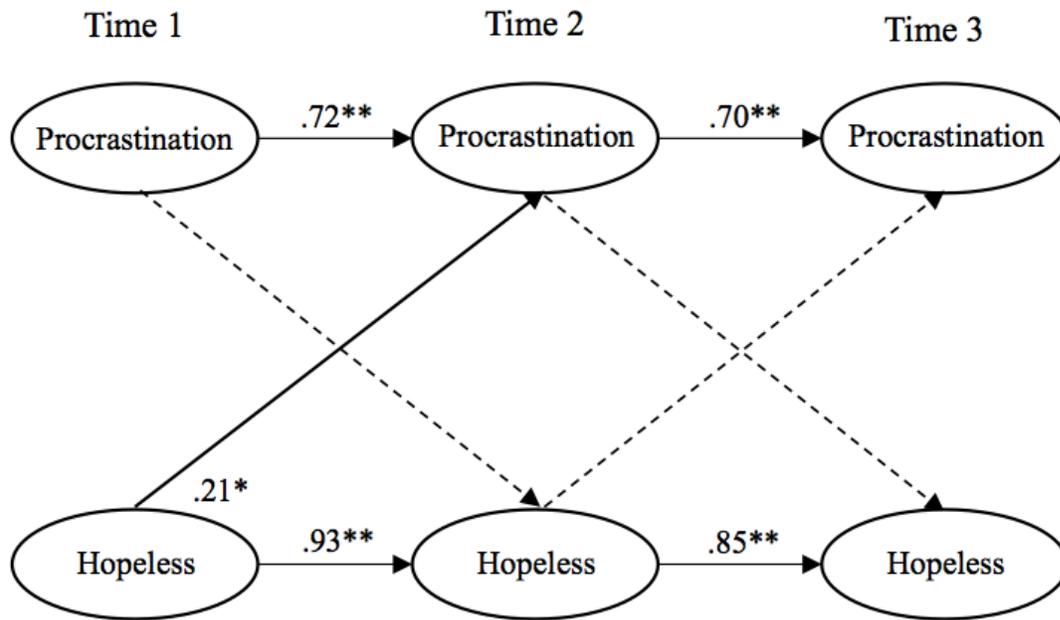
Figure A47. Cross-lagged results for procrastination and hopelessness (undergraduate students) with age as a covariate. *p <.05, **p <.001.
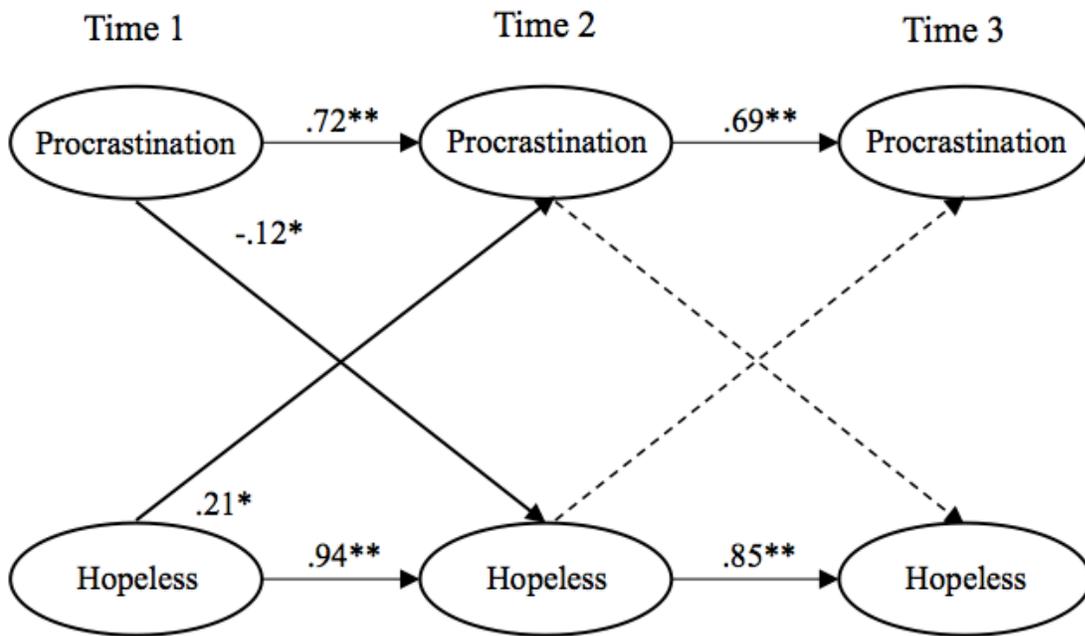
*Figure A48.* Cross-lagged results for procrastination and hopelessness (undergraduate students) with gender and age as covariates. *p <.05, **p <.001.
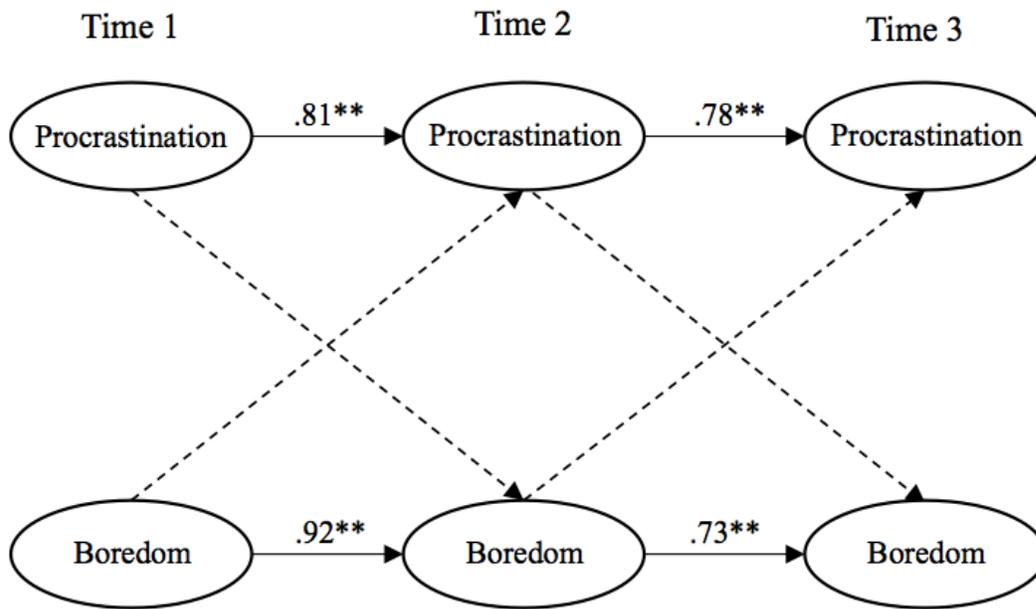
Figure A49. Cross-lagged results for procrastination and boredom (undergraduate students) with gender as a covariate. *p* <.05, **p* <.001.
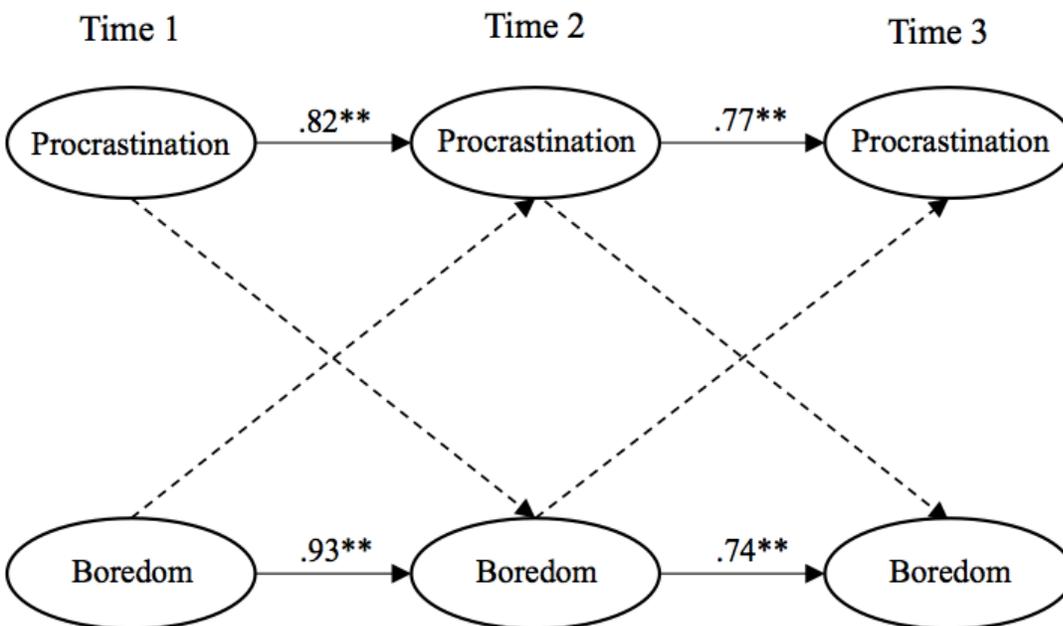
Figure A50. Cross-lagged results for procrastination and boredom (undergraduate students) with age as a covariate. *p* <.05, **p* <.001.
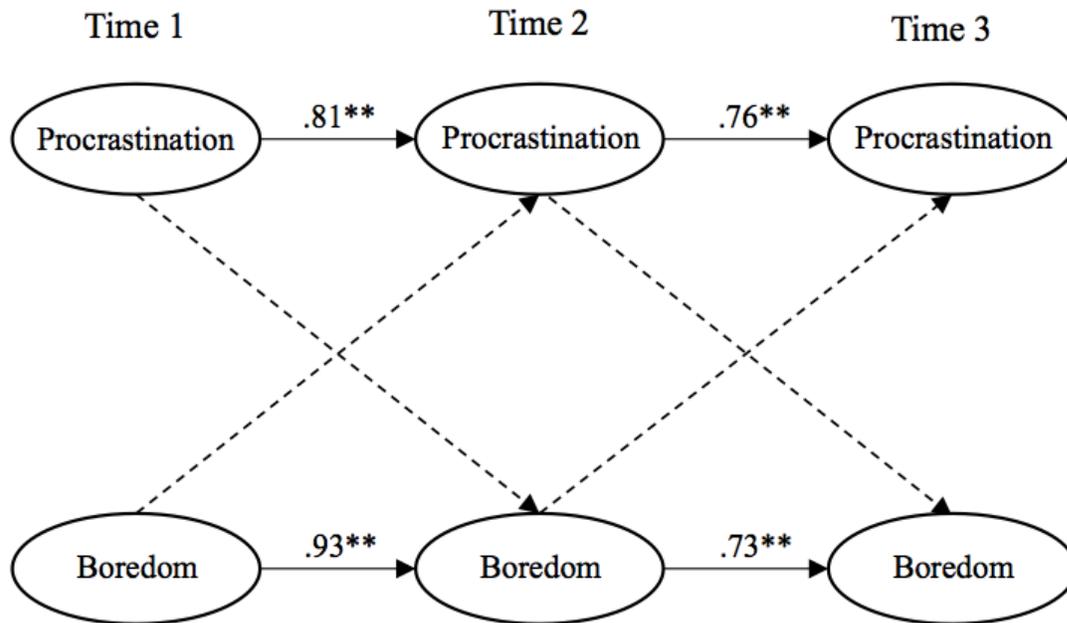
*Figure A51.* Cross-lagged results for procrastination and boredom (undergraduate students) with gender and age as covariates. *p* <.05, **p* <.001.
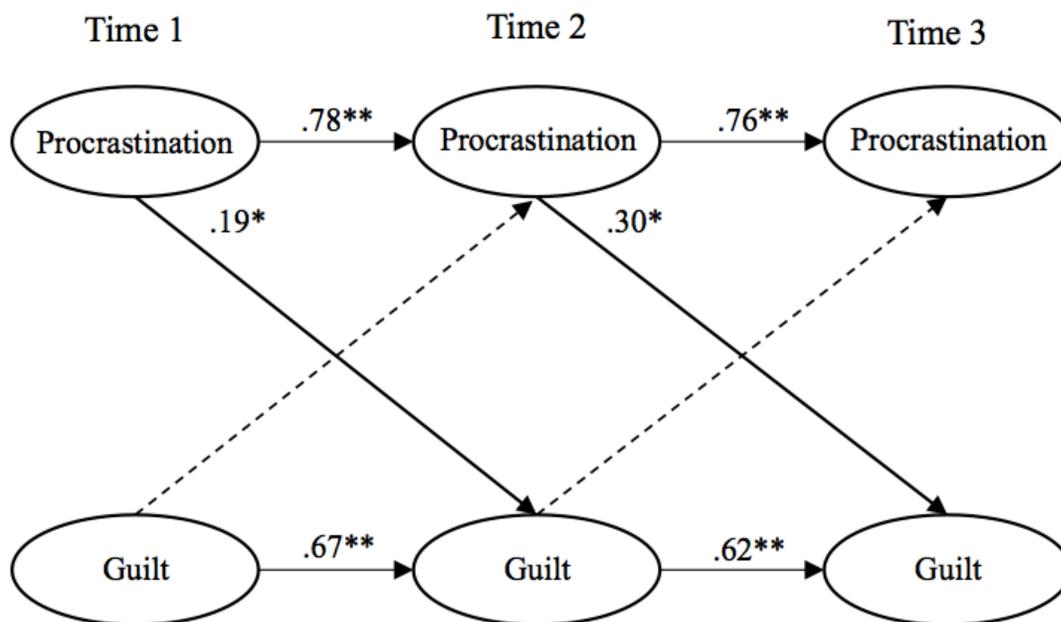
Figure A52. Cross-lagged results for procrastination and guilt (undergraduate students) with gender as a covariate. *p* <.05, **p* <.001.
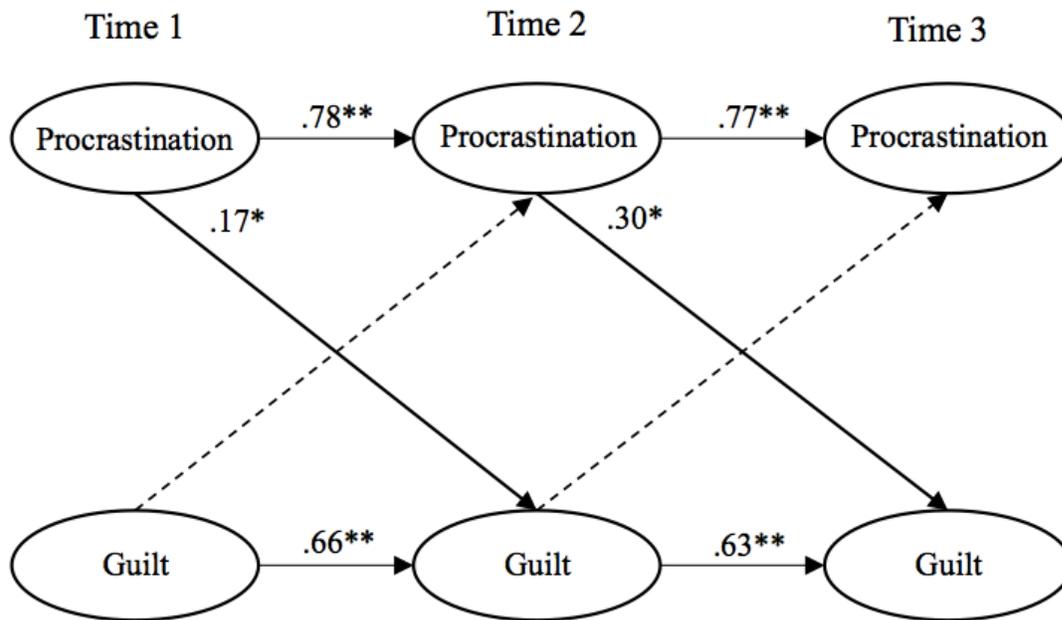
Figure A53. Cross-lagged results for procrastination and guilt (undergraduate students) with age as a covariate. *p <.05, **p <.001
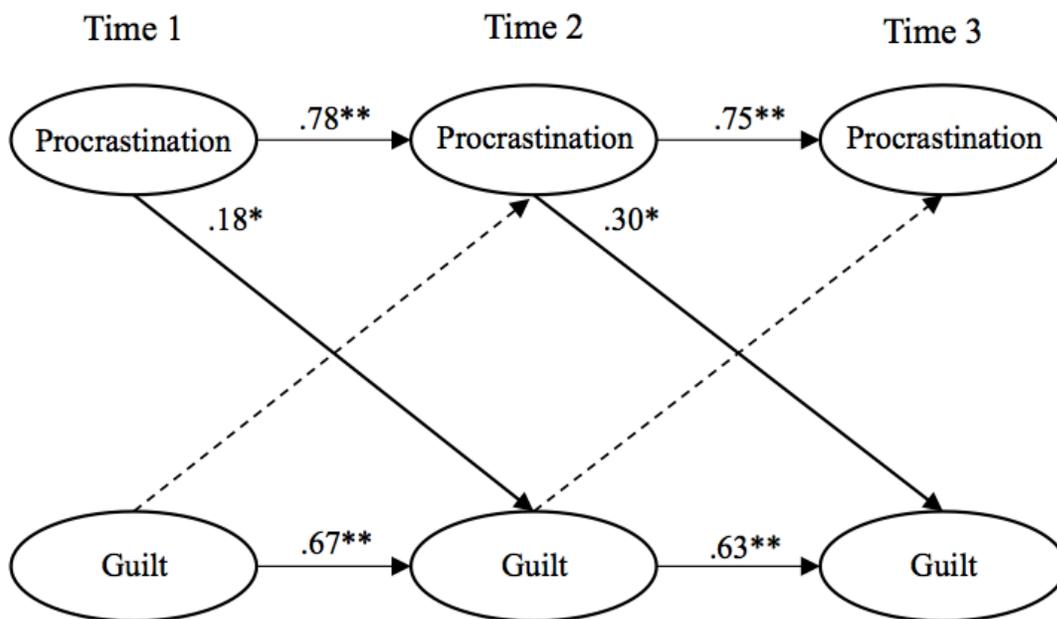
Figure A54. Cross-lagged results for procrastination and guilt (undergraduate students) with gender and age as covariates. *p <.05, **p <.001.

Table A1

Cross-lagged Models with Gender as a Covariate (Graduate Students)

Variable	CFI	TLI	RMSEA	90% Confidence Interval
Enjoyment	.982	.973	.031	.024-.038
Hope	.986	.979	.028	.021-.035
Pride	.978	.967	.034	.028-.041
Anger	.972	.959	.041	.035-.047
Anxiety	.986	.979	.029	.023-.036
Shame	.989	.984	.028	.021-.035
Hopelessness	.981	.971	.038	.031-.044
Boredom	.979	.968	.038	.031-.044
Guilt	.988	.982	.027	.020-.034

Table A2

Cross-lagged Models with Age as a Covariate (Graduate Students)

Variable	CFI	TLI	RMSEA	90% Confidence Interval
Enjoyment	.984	.975	.030	.023-.036
Hope	.986	.979	.028	.021-.035
Pride	.980	.969	.033	.027-.039
Anger	.971	.957	.042	.036-.048
Anxiety	.986	.980	.029	.022-.036
Shame	.990	.985	.027	.019-.033
Hopelessness	.982	.973	.037	.030-.043
Boredom	.980	.970	.036	.030-.042
Guilt	.988	.982	.027	.019-.033

Table A3

Cross-lagged Models with Gender and Age as Covariates (Graduate Students)

Variable	CFI	TLI	RMSEA	90% Confidence Interval
Enjoyment	.981	.972	.030	.024-.036
Hope	.986	.978	.027	.021-.034
Pride	.978	.966	.033	.027-.039
Anger	.970	.955	.041	.035-.046
Anxiety	.986	.978	.029	.022-.035
Shame	.989	.983	.027	.020-.034
Hopelessness	.980	.970	.036	.031-.042
Boredom	.978	.967	.036	.030-.042
Guilt	.987	.980	.027	.020-.033

Table A4

Cross-lagged Models with Gender as a Covariate (Undergraduate Students)

Variable	CFI	TLI	RMSEA	90% Confidence Interval
Enjoyment	.986	.979	.026	.007-.038
Hope	.975	.963	.034	.021-.045
Pride	.972	.958	.034	.022-.045
Anger	.965	.947	.043	.033-053
Anxiety	.982	.972	.031	.017-.042
Shame	.989	.984	.025	.005-.038
Hopelessness	.961	.941	.050	.040-.060
Boredom	.978	.968	.036	.025-.047
Guilt	.996	.994	.014	.000-.030

Table A5

Cross-lagged Models with Age as a Covariate (Undergraduate Students)

Variable	CFI	TLI	RMSEA	90% Confidence Interval
Enjoyment	.990	.985	.022	.000-.035
Hope	.978	.966	.032	.019-.044
Pride	.976	.963	.032	.019-.043
Anger	.966	.049	.042	.032-.052
Anxiety	.984	.976	.029	.014-.041
Shame	.982	.987	.022	.000-.035
Hopelessness	.961	.942	.050	.040-.060
Boredom	.978	.966	.037	.026-.048
Guilt	.997	.996	.011	.000-.029

Table A6

Cross-lagged Models with Gender and Age as Covariates (Undergraduate Students)

Variable	CFI	TLI	RMSEA	90% Confidence Interval
Enjoyment	.985	.977	.026	.008-.038
Hope	.977	.965	.031	.018-.042
Pride	.974	.961	.031	.019-.042
Anger	.966	.948	.041	.030-.050
Anxiety	.983	.974	.029	.014-.040
Shame	.989	.984	.024	.000-.036
Hopelessness	.961	.941	.048	.038-.057
Boredom	.977	.964	.036	.025-.047
Guilt	.998	.997	.010	.000-.027

Appendix B
Zero-order Correlations within Time 2 and 3 Assessments (Graduate Students)

Table B1

Zero-order Correlations Among Study Variables at Time 2 for Graduate Students

	1	2	3	4	5	6	7	8	9
1. Procrastination	---								
2. Enjoyment	-.28**	---							
3. Hope	-.40**	.66**	---						
4. Pride	-.26**	.70**	.72**	---					
5. Anger	.45**	-.32**	-.38**	-.20**	---				
6. Anxiety	.48**	-.11*	-.49**	-.27**	.51**	---			
7. Shame	.48**	-.19**	-.51**	-.363**	.43**	.77**	---		
8. Hopelessness	.51**	-.30**	-.62**	-.48**	.53**	.81**	.84**	---	
9. Boredom	.48**	-.378**	-.28**	-.16**	.68**	.28**	.31**	.37**	---
10. Guilt	.41**	-.18**	-.41**	-.32**	.46**	.62**	.66**	.68**	.31**

Table B2

Zero-order Correlations Among Study Variables at Time 3 for Graduate Students

	1	2	3	4	5	6	7	8	9
1. Procrastination	---								
2. Enjoyment	-.34**	---							
3. Hope	-.48**	.66**	---						
4. Pride	-.35**	.76**	.72**	---					
5. Anger	.47**	-.27**	-.39**	-.16**	---				
6. Anxiety	.55**	-.14*	-.53**	-.23**	.55**	---			
7. Shame	.53**	-.20**	-.56**	-.30**	.46**	.81**	---		
8. Hopelessness	.55**	-.33**	-.66**	-.42**	.55**	.83**	.83**	---	
9. Boredom	.50**	-.34**	-.28**	-.16**	.63**	.30**	.32**	.33**	---
10. Guilt	.46**	-.22**	-.49**	-.27**	.43**	.69**	.68**	.73**	.27**

Appendix C
Correlations Between Variable Parcels

Table C

Correlations Between Variable Parcels

Variable	Parcels (graduate students)			Parcels (undergraduate students)		
	P1 <-> P2	P1 <-> P3	P2<->P3	P1 <-> P2	P1 <-> P3	P2<->P3
Procrastination	.65*/.64**/.68**	.65**/.63**/.67**	.72**/.72**/.77**	.64*/.67**/.71**	.67**/.71**/.66**	.71**/.66**/.78**
Emotions						
Enjoyment	.59**/.61**/.65**	.52**/.54**/.61**	.66**/.67**/.67**	.67**/.66**/.72**	.63**/.66**/.71**	.71**/.66**/.72**
Hope	.73**/.76**/.76**	.50**/.58**/.56**	.57**/.65**/.65**	.68**/.75**/.78**	.57**/.57**/.63**	.63**/.56**/.73**
Pride	.62**/.66**/.74**	.61**/.62**/.66**	.54**/.59**/.64**	.58**/.60*/.52**	.59**/.53**/.64**	.62**/.52**/.57**
Anger	.60**/.68**/.65**	.69**/.73**/.66**	.74**/.80**/.75**	.61**/.67**/.65**	.67**/.70**/.72**	.75**/.67**/.81**
Anxiety	.73**/.74**/.78**	.61**/.66**/.70**	.71**/.70**/.74**	.71**/.77**/.82**	.56**/.45**/.70**	.66**/.62**/.74**
Shame	.78**/.81**/.86**	.77**/.78**/.80**	.77**/.81**/.83**	.80**/.80**/.87**	.73**/.73**/.80**	.78**/.74**/.80**
Hopelessness	.78**/.81**/.82**	.73**/.77**/.76**	.82**/.86**/.85**	.78**/.84**/.88**	.70**/.77**/.78**	.84**/.84**/.88**
Boredom	.73**/.79**/.80**	.75**/.77**/.80**	.77**/.82**/.81**	.78**/.80**/.83**	.77**/.79**/.85**	.82**/.87**/.88**
Guilt	.66**/.69**/.72**	.61**/.67**/.67**	.77**/.78**/.83**	.74**/.77**/.76**	.65**/.73**/.77**	.76**/.79**/.71**

Note. *p < .05, **p < .01.

Appendix D
Zero-order Correlations within Time 2 and 3 Assessments (Undergraduate Students)

Table D1

Zero-order Correlations Among Study Variables at Time 2 for Undergraduate Students

	1	2	3	4	5	6	7	8	9
1. Procrastination	1								
2. Enjoyment	-.22**	1							
3. Hope	-.36**	.65**	1						
4. Pride	-.34**	.69**	.76**	1					
5. Anger	.53**	-.20*	-.31**	-.21**	1				
6. Anxiety	.53**	0.01	-.37**	-.28**	.53**	1			
7. Shame	.43**	0.04	-.36**	-.27**	.43**	.75**	1		
8. Hopelessness	.50**	-.17*	-.56**	-.54**	.51**	.76**	.78**	1	
9. Boredom	.41**	-.22**	-.21**	-0.08	.69**	.28**	.25**	.29**	1
10. Guilt	.42**	-0.01	-.30**	-.30**	.36**	.63**	.63**	.61**	.17*

Table D2

Zero-order Correlations Among Study Variables at Time 3 for Undergraduate Students

	1	2	3	4	5	6	7	8	9
1. Procrastination	1								
2. Enjoyment	-.24*	1							
3. Hope	-.57**	.72**	1						
4. Pride	-.37**	.75**	.77**	1					
5. Anger	.47**	-.21*	-.32**	-.24*	1				
6. Anxiety	.60**	-.20*	-.51**	-.35**	.59**	1			
7. Shame	.56**	-0.19	-.50**	-.35**	.50**	.79**	1		
8. Hopelessness	.61**	-.31**	-.63**	-.47**	.60**	.85**	.80**	1	
9. Boredom	.35**	-.31**	-.23*	-0.17	.68**	.43**	.41**	.48**	1
10. Guilt	.48**	-0.17	-.41**	-.38**	.47**	.67**	.57**	.64**	.41**

Appendix E
Questionnaire Items

Demographics

First Name _____ (open-ended)

Last Name _____ (open-ended)

Institutional E-mail Address _____ (open-ended)

Secondary E-mail Address _____ (open-ended)

Age in Years _____ (open-ended)

Gender (drop-down menu)
- Female
- Male
- Gender Variant/Non-Conforming
- Other
  - Please specify _____ (open-ended)

Relationship status (drop-down menu)
- Single
- Married/civil union
- In serious relationship
- Other _____ (open-ended)

Is English your first language (yes/no)? If not, what is? _____ (open-ended)

Are you an international student? (yes/no)

What is your country or origin? (drop-down menu)
- USA
- France
- China
- India
- Saudi Arabia
- Iran
- South Korea
- Pakistan
- United Kingdom
- Germany
- Japan
- Turkey
- Bangladesh
- Mexico
- Brazil
- Australia
- Italy
- Switzerland
- Taiwan
- Egypt
- Israel
- Lebanon
- Colombia
- Other _____ (open-ended)

Do you have children? (yes/no)

What is your highest education level? (drop-down menu). Note: Items with an asterisk will not be included as options for the online sample.
- CEGEP*
- High-school
- Bachelor's degree
- Master's degree
- PhD

What year are you in the program? (drop-down menu, for undergraduate students only)
- First Year Undergraduate
- Second Year Undergraduate
- Third Year Undergraduate
- Fourth Year Undergraduate
- Fifth Year Undergraduate

Are you in a Masters, PhD, or Combined degree program? (drop-down menu, graduate students only)
- Masters
- PhD
- Combined

Are you a full-time or part-time student? (full-time/part-time)

What is your family income? (drop-down menu)
- <$20,000
- $20,000 - $40,000
- $40,000 – $60,000
- $60,000-$80,000
- >$80,000
- I prefer not to answer

Do you wish to be entered into the cash prize draw for this study phase and notified by email? (yes/no)

Academic Procrastination State Inventory (APSI, 13 Items)

Instructions: "How frequently last week did you engage in the following behaviors or thoughts?"

 Response Format: 1(not), 5 (always)

1. Drifted off into day dreams while studying.
2. Studied the subject matter that you had planned to do.
3. Had no energy to study.
4. Prepared to study at some point of time but did not get any further.
5. Gave up when studying was not going well.
6. Gave up studying early in order to do more pleasant things.
7. Put off the completion of a task.
8. Allowed yourself to be distracted from your work.
9. Experienced concentration problems when studying.
10. Interrupted studying for a while in order to do other things.
11. Forgot to prepare things for studying.
12. Did so many other things that there was insufficient time left for studying.
13. Thought that you had enough time left, so that there was really no need to start studying.

Procrastination Assessment Scale For Students (PASS, 9 Items)

Source: Solomon, L. J., & Rothblum, E. D. (1984). Academic procrastination: Frequency and cognitive-behavioral correlates. *Journal of Counselling Psychology*, *31*(4), 503-509.

Instructions: "For each of the following activities, please rate the degree to which you wait until the last minute to do the activity, feel procrastination on that task is a problem, and would like to decrease your tendency to procrastinate on that task."

Response Format for Items 1, 4, 7, 10, 13, 16: 1 (never procrastinate), 5 (always procrastinate)
Response Format for Items 2, 5, 8, 11, 14, 17: 1 (not at all), 5 (always)
Response Format for Items 3, 6, 9, 12, 15, 18: 1 (do not want to decrease), 5 (definitely want to decrease)

I. WRITING A TERM PAPER
1. To what degree do you procrastinate on this task?
2. To what degree is procrastination on this task a problem for you?
3. To what extent do you want to decrease your tendency to procrastinate on this task?

II. STUDYING FOR EXAMS
4. To what degree do you procrastinate on this task?
5. To what degree is procrastination on this task a problem for you?
6. To what extent do you want to decrease your tendency to procrastinate on this task?

III. KEEPING UP WITH WEEKLY READING ASSIGNMENTS
7. To what degree do you procrastinate on this task?
8. To what degree is procrastination on this task a problem for you?
9. To what extent do you want to decrease your tendency to procrastinate on this task?

_____

Achievement Emotions Questionnaire – Learning-Related (AEQ; 75 Items)

Source: Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic emotions in students' self- regulated learning and achievement: A program of quantitative and qualitative research. *Educational Psychologist, 37*, 91-106.

Instructions: "Below are specific questions about emotions you may experience while studying. Before answering the questions on the following pages, please recall some typical situations of studying which you have experienced during the course of your studies."

Response Format: 1 (strongly disagree) to 5 (strongly agree)

1. I look forward to studying.
2. I get so nervous that I don't even want to begin to study.
3. I feel confident that I will be able to master the material.
4. Because I get so upset over the amount of material, I don't even want to begin studying.
5. When I have to study I start to feel queasy.
6. When I look at the books I still have to read, I get anxious.
7. Because I'm bored I have no desire to learn.
8. I have an optimistic view toward studying.
9. I feel ashamed about my constant procrastination.
10. I get angry when I have to study.
11. My lack of confidence makes me exhausted before I even start.
12. I'm annoyed that I have to study so much.
13. I would rather put off this boring work till tomorrow.
14. I feel optimistic that I will make good progress at studying.
15. I feel hopeless when I think about studying.
16. I worry whether I'm able to cope with all my work.
17. Because I'm bored I get tired sitting at my desk.
18. I feel confident when studying.
19. I feel ashamed that I can't absorb the simplest of details.
20. I get so angry I feel like throwing the textbook out of the window.
21. My hopelessness undermines all my energy.
22. While studying I feel like distracting myself in order to reduce my anxiety.
23. The material bores me so much that I feel depleted.
24. The thought of achieving my learning objectives inspires me.
25. I feel ashamed because I am not as adept as others in studying.
26. When I sit at my desk for a long time, my irritation makes me restless.
27. I'm proud of my capacity.
28. I feel so helpless that I can't give my studies my full efforts.
29. I find my mind wandering while I study.
30. I study more than required because I enjoy it so much.
31. As time runs out my heart begins to race.
32. The material bores me to death.
33. My sense of confidence motivates me.

34.   When somebody notices how little I understand I avoid eye contact.
35.   Studying makes me irritated.
36.   I wish I could quit because I can't cope with it.
37.   When my studies are going well, it gives me a rush.
38.   I get tense and nervous while studying.
39.   While studying this boring material, I spend my time thinking of how time stands still.
40.   I turn red when I don't know the answer to a question relating to the course material.
41.   I get angry while studying.
42.   When I solve a difficult problem in my studying, my heart beats with pride.
43.   I'm resigned to the fact that I don't have the capacity to master this material.
44.   I enjoy the challenge of learning the material.
45.   The subject scares me since I don't fully understand it.
46.   While studying I seem to drift off because it's so boring.
47.   I feel ashamed.
48.   I get annoyed about having to study.
49.   Because I want to be proud of my accomplishments, I am very motivated.
50.   I feel helpless.
51.   I enjoy dealing with the course material.
52.   Worry about not completing the material makes me sweat.
53.   Studying for my courses bores me.
54.   I feel embarrassed about not being able to fully explain the material to others.
55.   When I excel at my work, I swell with pride.
56.   I get physically excited when my studies are going well.
57.   Studying is dull and monotonous.
58.   I feel ashamed when I realize that I lack ability.
59.   I enjoy acquiring new knowledge.
60.   The material is so boring that I find myself daydreaming.
61.   I worry whether I have properly understood the material.
62.   Because I have had so much troubles with the course material, I avoid discussing it.
63.   After extended studying, I'm so angry that I get tense.
64.   I'm proud of myself.
65.   After studying I'm resigned to the fact that I haven't got the ability.
66.   I am so happy about the progress I made that I am motivated to continue studying.
67.   When I can't keep up with my studies it makes me fearful.
68.   My memory gaps embarrass me.
69.   I'm discouraged about the fact that I'll never learn the material.
70.   Reflecting on my progress in coursework makes me happy.
71.   I don't want anybody to know when I haven't been able to understand something.
72.   I think I can be proud of my accomplishments at studying.
73.   I feel resigned.
74.   Certain subjects are so enjoyable that I am motivated to do extra readings about them.
75.   I worry because my abilities are not sufficient for my program of studies.

The Personal Feelings Questionnaire (Guilt: 6 Items)

Source: Adapted version of: Harder, D. W., & Lewis, S. J. (1987). The assessment of shame and guilt. *Advances in Personality Assessment*, *6*, 89-114.

Instructions: "Below are specific questions about emotions you may experience while studying. Before answering the questions on the following pages, please recall some typical situations of studying which you have experienced during the course of your studies.

Response Format: 1 (I do not experience the feeling), 5 (I experience the feeling very strongly).

1. Mild guilt
2. Worry about causing difficulties for others
3. Intense guilt
4. Regret
5. Feeling you deserve criticism for what you did
6. Remorse

Appendix F
Ethics Approval

McGill

Research Ethics Board Office   Tel: (514) 398-6831
James Administration Bldg.
845 Sherbrooke Street West. Rm 325   Website: www.mcgill.ca/research/researchers/compliance/human/
Montreal, QC H3A 0G4

Research Ethics Board II
Certificate of Ethical Acceptability of Research Involving Humans

REB File #: 131-0817

Project Title: Academic Procrastination and Emotions: A Mixed-Methods Design

Principal Investigator: Sonia Rahimi   **Status:** Ph.D. Student

Department: Educational Counselling Psychology   **Supervisor:** Prof. Nathan Chad Hall

Funding: SSHRC

Approval Period: <u>August 31, 2017 to August 30, 2018</u>

The REB-II reviewed and approved this project by delegated review in accordance with the requirements of the
McGill University Policy on the Ethical Conduct of Research Involving Human Participants and the Tri-Council
Policy Statement: Ethical Conduct for Research Involving Humans.

Deanna Collin
Ethics Review Administrator, REB I & II

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* Approval is granted only for the research and purposes described.
* Modifications to the approved research must be reviewed and approved by the REB before they can be implemented.
* A Request for Renewal form must be submitted before the above expiry date. Research cannot be conducted without a current ethics
approval. Submit 2-3 weeks ahead of the expiry date.
* When a project has been completed or terminated, a Study Closure form must be submitted.
* Unanticipated issues that may increase the risk level to participants or that may have other ethical implications must be promptly reported to
the REB. Serious adverse events experienced by a participant in conjunction with the research must be reported to the REB without delay.
* The REB must be promptly notified of any new information that may affect the welfare or consent of participants.
* The REB must be notified of any suspension or cancellation imposed by a funding agency or regulatory body that is related to this study.
* The REB must be notified of any findings that may have ethical implications or may affect the decision of the REB.