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University Students' Cognitive Strategies, Emotions, Procrastination, and Motivation for Learning

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by

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Abstract

The purpose of the study was to examine how cognitive and metacognitive strategies and motivation for learning were associated with academic emotions and academic procrastination. A cross sectional research design was employed to gather data from 101 university students enrolled in a Psychology course at King's University College (80 females; Mean age = 21.60, *SD* = 5.50). Students completed an electronic questionnaire via Qualtrics survey tool that measured four variables: cognitive and metacognitive strategies, academic emotions, academic procrastination and motivation for learning. Significant correlations were found between all study variables. In addition, students' positive academic emotions were identified to predict metacognitive self-regulation. As well as students' negative academic emotions were found to predict their academic procrastination. Furthermore, a difference between males and females were found in cognitive and metacognitive strategies, although only in cognitive elaboration strategies. This study indicates that cognitive and metacognitive learning strategies in university were related to academic emotions and academic procrastination. Altogether, university students should practice emotional regulation and adaptive behaviours to maximize university learning.

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University Students' Cognitive Strategies, Emotions, Procrastination, and Motivation for Learning

In general, "self-regulated" refers to individuals' engagement in adaptive patterns of cognition, emotion, and behaviour to attain goals (Zimmerman, 2000). Within the Educational Psychology literature, SR is studied as self-regulated learning (SRL) which describes how students apply metacognition, motivation for learning and strategic action to engage in academic learning in school. Metacognition includes knowledge about cognition and self-regulation of cognition (Pintrich, 1999). Self-regulating learners are metacognitive when they monitor, reflect, and evaluate their performance and adjust their learning strategies (Pintrich, 2000). Motivation involves self-efficacy (i.e., confidence), goal setting, and attributions (Hutchinson, 2013). Learners demonstrate motivation for learning when they persist on challenging learning tasks. Strategic action is the behavioural manifestation of learners' metacognition and motivation – it describes what learners do to achieve their goals (Pintrich, 2000; Zimmerman, 1999). Learners are strategic when they are able to choose strategies that are well suited to accomplish their goals (Zimmerman, 1999).

Findings from over thirty years of research has demonstrated that students' SRL is associated with favourable educational outcomes, including deeper levels of cognitive processing (Zimmerman, 2000), the development of more sophisticated cognitive strategies (Pintrich, 1999), and higher levels of motivation and persistence (Zimmerman, 1999). Also, SRL is associated with lower levels of procrastination (Park & Sperling, 2012), higher levels of emotional regulation (Pekrun et al., 2002), well-being (Gavala & Flett, 2005), lower levels of negative affect (i.e., anger and sadness) and higher levels of academic achievement (Yip, 2007; Zimmerman 1999). However, not all students adopt SRL to succeed in school. Some students

develop and engage in patterns of learning that are referred to as ineffective and defensive, these learners tend to adopt maladaptive strategies. They also tend to exhibit a low sense of self-efficacy, tend to give up or procrastinate when confronted with difficulties in learning. Indeed, this brings forth negative patterns of learning in relationship to SRL.

The purpose of the present study was to examine how university student's cognitive and metacognitive strategies and motivation for learning were associated with academic emotions and patterns of academic procrastination, which are reviewed below.

Self-Regulated Learning and Cognitive Strategies

An important component of students' SRL is their cognitive learning strategies (i.e., how students engage in thinking to learn effectively). Students are more likely to be successful in their learning when they approach their thinking with cognitive strategies that includes: rehearsal (e.g., copying and encoding information), elaboration (e.g. paraphrasing and summarizing information), and organization strategies (Weinstein & Mayer, 1986).

In their study, Sadi and Uyar (2013) found that cognitive rehearsal strategies such as repetition and memorization are important for encoding information into short-term memory but were best used in combination with patterns of cognition that include elaboration and organization (e.g. writing outlines). In their work, Al-Harthy and Was (2010) demonstrated that organizational strategies used to build connections among ideas tended to enhance meaning and understanding of schoolwork which was likely to lead to better academic performance. Elaboration strategies are likely to support students to cognitively integrate new information with prior knowledge which can promote better learning and academic performance (Weinstein & Mayer, 1986).

Studies (e.g. Sadi & Uyar, 2013; Pintrich, 1999) have indicated that students are more likely to experience academic success when they incorporate all three types of cognitive strategies (i.e. rehearsal, elaboration, summarizing) in their learning. These strategies have been associated with enhanced understanding of information but also promote critical thinking, knowledge transfer, and problem-solving skills (Sadi & Uyar, 2013; Pintrich, 1999). Additionally, research has indicated that students' use of rehearsal, elaboration, and organization strategies tend to distinguish high and low achieving students. Students who report engaging in more cognitive learning strategies also tend to receive higher grades (Sadi and Uyar, 2013). Cognitive strategies directly impact students' ability to focus, memorize, organize and problem solve. In their research, Thibodeaux, Deutsch, Kitsantas, and Winsler (2016) found that students' who reported engaging in SRL, also reported utilizing more cognitive strategies for learning. In the present study, students' cognitive and metacognitive strategies were investigated to examine their relationship with learners' motivation and academic emotions, described below.

Self-Regulated Learning and Motivation

Another hallmark of students' SRL is their motivation for learning. Motivation involves learners' self-efficacy (confidence in their ability to succeed), goal setting (establishing measurable goals), and attributions (establishing an action as being caused by a person or object). In their work, Komarraju and Nadler (2013) examined the relationship between undergraduate students' self-efficacy and their academic achievement. Results demonstrated that self-efficacy was a statistically significant and positive predictor of academic achievement; students who were endorsed higher levels of self-efficacy reported higher levels of metacognitive monitoring academic perseverance. In addition, findings demonstrated that students' effort regulation was a partial mediator of the relationship between self-efficacy and GPA, indicating that regulating

effort caused students to believe in their ability to succeed which influenced their grades. In addition, Zimmerman (1999) examined self-efficacy and motivational beliefs in university students. Results demonstrated that students' perception of self-efficacy was highly predictive of goal setting and SRL strategies.

Studies have also linked motivation to students' goals for learning. For example, Morisano et al., (2010) examined struggling students and academic achievement. Students who experienced academic difficulties were randomly assigned to participate in a 4-month goal setting program to improve their academic achievement. Findings demonstrated that students in the goal setting program displayed significant improvement in their academic performance compared to a control group that did not receive the goal setting program. Moreover, Al-Ansari (2005) examined the relationship between motivation and cognition in university students using a series of self-report questionnaires. Results demonstrated that motivation (operationalized as task value), if a task was worth pursuing, was related to students' cognitive, metacognitive, and effort, which in turn, were related to students' academic achievement. Taken together, findings demonstrated that learners' goal setting, adoption of adaptive motivational beliefs, and self-efficacy can enhance their engagement in SRL.

Research has linked students' needs for self-determination to their SRL. Self-Determination Theory (SDT) is a motivation theory which asserts that all individuals have needs for (1) autonomy which refers to the need to experience own behavior as free will and perceive actions caused by internal reasons rather than external (Ryan & Connell, 1989), (2) belonging which is the is the feeling of connectedness with significant others, and (3) competence which is the need to experience satisfaction when performing own capabilities (Levesque et al., 2004). These needs have to be met to create psychological growth (Ryan & Connell, 1989). Levesque et

al., (2004) examined the role of autonomy and competence in German and American university students. Results demonstrated that German students felt more autonomous but less competent than American students. However, American students had higher competence and felt more in control of their performance outcomes. It was hypothesized that the distinction existed because of the differences in cultures' external guidance, meaning that American and German countries have culture differences in competence of skills (Gellert, 1993; Nenniger, 1989). Zimmerman (1999) supported this finding because students who reported higher control over their external factors had higher autonomy and control over their SRL.

Also, research has linked SDT to academic emotions. Gonzalez et al., (2012) examined motivation and its association with academic emotions. Findings found that motivation (i.e. intrinsic motivation) was positively associated with pleasant emotions. Similarly, they found that the higher the level of autonomy, the more pleasant emotions the students felt. In addition, Fredrickson (1998, 2001) found that positive emotions promote academic competence (e.g. exploring, problem solving). The purpose of this study was to examine how students' autonomy and controlled regulation were associated with their reports of cognitive and metacognitive strategies, academic emotions, and academic procrastination.

Self-Regulated Learning and Procrastination

Students' procrastination has been linked to low SRL where procrastination is "voluntarily delaying an intended course of action despite expecting to be worse off for the delay (Steel, 2007, p.66)". Procrastination is regarded as a maladaptive pattern of emotions, cognition, and behaviour which are thought to hinder successful academic performance (Fee & Tangney, 2000; Park & Sperling, 2012; Pintrich, 2000; Zimmerman, 2000). Harriot and Ferrari (1996) found that procrastination is a particularly common pattern of learning in university students.

Procrastination in students has been associated with turning in late assignments, missing or attending class late, not preparing enough for tasks, and giving up on studying (Park & Sperling, 2012). Additionally, research has supported that procrastinators experience high levels of stress which impacts health in university (Tice & Baumeister, 1997).

In their work, Park and Sperling (2012) investigated the relationship between academic procrastination and SRL in university students. The researchers administered a series of self-report surveys and conducted semi-structured interviews. Results demonstrated that high procrastinators showed a lack of SR across the areas of regulation, cognition, motivation, and behaviour. The results supported that the strongest predictor of procrastination was low self-efficacy. Reasons for procrastination included lack of time management, laziness, lack of energy, and avoidance. Furthermore, Deniz, Tras, and Aydogan, (2009) examined the relationship between negative emotions (e.g. anxiety) and procrastination. The researchers administered self-report questionnaires to university students. Results demonstrated that anxiety levels predicted procrastination. In addition, a negative correlation was found between emotional intelligence skills, that is the ability to understand and guide one's own emotion with procrastination. Altogether, findings from these studies demonstrate that procrastination is a maladaptive learning strategy that is associated with low SR including cognition and emotions. In the present study, procrastination will be examined to see the relationship it has between cognitive and metacognitive strategies and academic emotions.

Self-Regulated Learning and Academic Emotions

Emotions also factor into students' learning and can influence their patterns of cognition, motivation and behaviors (Asikainen, Hailikari, & Mattson 2017). For example, Pekrun et al., (2002) examined how academic emotions of hope, pride, anxiety, and anger influenced

university students' engagement in SRL. Results demonstrated that emotions of enjoyment, hope, and pride correlated positively with students' motivation to learn, and academic effort. A statistically significant and positive correlation was observed between (a) positive academic emotions and SRL and (b) negative academic emotions and external regulation. Also, Asikainen, Hailikari, & Mattson (2017) analyzed students' academic emotions with SRL and study success via questionnaires. They found that students who take responsibility and monitor their studies were more likely to be optimistic about their studies and feel less negative emotions such as anxiety or feeling ashamed. Equally, students who feel optimistic about their study tend to succeed in managing their studies and achieve greater success in their studies despite experiencing negative feelings. Similarly, it was found that hope was the strongest predictor for study success.

Altogether, results of previous research demonstrate that positive emotions support students' SRL whereas negative emotions may curtail learners' development of and engagement in it. The ways in which students cope with emotions, particularly negative affect (e.g. anger, sadness) in a learning environment has been associated with learning outcomes (Asikainen, Hailikari, & Mattson 2017). Research demonstrates successful emotional SR skills can help students to cope with the effect of negative feelings such as frustration and anxiety in ways that support (rather than curtail) their learning (Asikainen, Hailikari, & Mattson 2017). Moreover, Rand (2009) examined university students' hope and optimism with their expected grades and academic performance at the end of the course. Results indicated that hope highly influences expected grades and academic performance, with optimism affecting academic performance when paired with aspects of hope. Taken together, findings from previous research demonstrate that hope and optimism can support adaptive and effective patterns of cognition and motivation

such as those involved in SRL. The present study will examine positive and negative academic emotions and how it is associated with cognitive and metacognitive strategies, academic procrastination, and motivation for learning.

Self-Regulated Learning in Males and Females

Previous research has indicated that males and females differ in their cognitive and metacognitive strategies. Yusri, Rahimi, Shah, and Wah, (2013) investigated cognitive and metacognitive learning strategies in Arabic language students. Researchers administered a self-report questionnaire to students to examine cognitive and metacognitive strategies and sex differences. Results found that females used cognitive strategies at a higher level compared to males. Specifically, in rehearsal, organization, and in metacognitive strategies. In addition, Sheoroy and Mokhtari, (2001) examined metacognitive strategies in native and non-native English speakers. Researchers had college students complete a survey about reading strategies. Results demonstrated that male and female native English speakers differed in their reading strategies with females reporting higher metacognitive strategy use. Furthermore, Justice and Dornan, (2001) investigated metacognition and motivation in college students. Researchers had students complete a self-report questionnaire on study skills, motivation and memory strategies. Researchers found a sex difference between males and females where males experienced more negative correlations with their cognitive strategies and midterm grades. In the present study, cognitive and metacognitive learning strategies will be examined to determine if males and females differ in their use of these strategies.

Summary and Research Questions

A review of the literature indicates that studies have documented the many positive effects of SRL on learning and achievement. Most research in this area seems to focus how a

single factor is associated with SRL (e.g. procrastination and SRL). However, less research has been devoted to researching four variables together (cognition, emotions, procrastination, and motivation) and how they all influence SRL. This is important because it is hypothesized that all variables work together to either enhance or decrease SRL in university students. The purpose of the present study was to examine how cognitive and metacognitive strategies and motivation for learning were associated with academic emotions and academic procrastination. Four research questions and hypotheses were examined. First, what are the relationships among university students' cognitive and metacognitive strategies, academic procrastination, academic emotions, and, autonomy and controlled regulation? It is hypothesized that all the variables will correlate with each other to influence SRL. Second, do university students' positive academic emotions (e.g. test enjoyment, test hope, test pride, test relief) predict their metacognitive self-regulation? It is hypothesized that students who report more positive academic emotions will report higher metacognitive self-regulation. Third, do university students' negative academic emotions (e.g. test anger, test anxiety, test shame, and test hopelessness) predict their academic procrastination? It is hypothesized that students who report more negative academic emotions will report higher levels of academic procrastination. Fourth, do males and females differ in their use of cognitive and metacognitive learning strategies? It is hypothesized that males and females will differ in their cognitive and metacognitive learning strategies with females reporting higher levels compared to males.

Method

Design

This study employed a cross-sectional research design to address four research questions.

Participants

Participants were 101 students (Mean age = 21.6 years, *SD* = 5.5 years; 80 females) enrolled in Psychology 1000 at King's University College. In this sample, 63.4% students reported their ethnicity as White, 15.9% reported their ethnicity as Asian, 7.9% reported other, 6.9% reported their ethnicity as Arab, 4% reported their ethnicity Black, 1% reported their ethnicity as Latin American, and 1% reported their ethnicity as Aboriginal/First Nations.

Measures

A demographic information form was utilized to obtain demographic information about the participants and four questionnaires were used to assess different learning strategies and emotions.

Demographics Information Form (Appendix A*).* The demographic information form contained five questions. Two questions asked participants to indicate their birthdate and study major. Three questions asked participants to indicate their gender, ethnicity, and year of study.

Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, Garcia, & McKeachie, 1986). In its entirety, the MSLQ is an 81-item self-report measured designed to assess students' motivation and strategies for learning. For this study, 31 items from the Cognitive and Metacognitive Strategies scale of the MSLQ were employed to assess students' engagement in five learning strategies: Rehearsal (4 items; e.g., "I memorize key words to remind me of important concepts in this class"), Elaboration (6 items; e.g., "When reading for this class, I try to relate the material to what I already know), Organization (4 items; e.g., "I make simple charts, diagrams, or tables to help me organize course material), Critical Thinking (5 items; e.g., "I treat the course material as a starting point and try to develop my own ideas about it), and Metacognitive Self-Regulation (12 items; e.g., "When reading for this course, I make up

questions to help focus my reading). Students responded to items using a seven-point Likert scale, with endpoints ranging from 1 (not at all true of me) to 7 (very true of me). Cronbach's alpha was computed for each of the five learning strategies subscales: Rehearsal (α = .68; 95% CI = .57 to .77) Elaboration (α = .81; 95% CI = .74 to .86), Organization (α = .53; 95% CI = .36 to .66), Critical Thinking (α = .73; 95% CI = .64 to .81), and Metacognitive Self-Regulation (α = .76; 95% CI = .68 to .82). Mean scores were computed for each of the five learning subscales by aggregating the individual item scores and dividing by the number of items.

Procrastination Assessment Scale-Student (PASS; Solomon & Rothblum, 1984). The PASS is 52-item instrument designed to assess student's procrastination on six types of academic tasks (writing a term paper, studying for exams, completing weekly readings, registering for classes, attending classes, school activities; 18 items) their reasons for procrastinating on them (26 items) and interest in changing procrastination (8 items). Students' reasons for procrastination are divided into two subscales: Fear of Failure (12 items; e.g., "You were worried you would get a bad grade") and Aversiveness of Task (14 items; e.g., "You really disliked writing term papers). Students responded to the academic tasks items using a five-point Likert scale, with end points ranging from 1 (never procrastinate) to 5 (always procrastinate). Students responded to the reasons for procrastination and changing procrastination using a five-point Likert scale, with end points ranging 1 (not at all reflects why I procrastinated) to 5 (definitely reflects why I procrastinated). Cronbach's alpha for the Fear of Failure subscale was computed at α = .87 (95% CI = .82 to .91). The Aversiveness of Task subscale had a Cronbach's alpha = .62 (95% CI = .48 to .74). Average scores were computed for the Fear of Failure and Aversiveness of Task subscales by summing the individual item scores for each subscale and dividing by the

number of items.

Achievement Emotions Scale (AEQ; Pekrun & Goetz, 2005). The AEQ is comprised of 232 items that measure students' achievement emotions in three areas: classroom emotions, (80 items; e.g., "Please indicate how you feel, typically, before you go to class"), learning emotions (75 items; "Please indicate how you feel, typically, after having studied"), and test-related emotions (77 items; "I worry whether I have studied enough"). For this study, the 77-item test emotions scale was employed to measure eight academic emotions: Test Enjoyment (10 items; e.g., "I look forward to the exam), Test Hope (8 items; e.g., "I am very confident), Test Pride (10 items; e.g., "I am proud of myself"), Test Relief (6 items; e.g., "I finally can breathe again"), Test Anger (10 items; e.g., "I get angry about the teacher's grading standards), Test Anxiety (12 items; e.g., "I feel panicky when writing the exam), Test Shame (10 items; e.g., "My marks embarrass me"), and Test Hopelessness (11 items; e.g., "I feel like giving up"). Students responded to items using a five-point Likert scale, with end points ranging from 1 (strongly disagree) to 5 (strongly agree). Cronbach's alpha for the eight test emotions subscales were computed: Test Enjoyment ($\alpha = .82$; 95% CI = .76 to .87), Test Hope ($\alpha = .82$; 95% CI = .77 to .87), Test Pride ($\alpha = .89$; 95% CI = .85 to .92), Test Relief ($\alpha = .83$; 95% CI = .78 to .88), Test Anger ($\alpha = .89$; 95% CI = .85 to .92), Test Anxiety ($\alpha = .93$; 95% CI = .91 to .95), Test Shame ($\alpha = .89$; 95% CI = .85 to .92), and Test Hopelessness ($\alpha = .94$; 95% CI = .92 to .96). Scores for the eight academic emotions were computed by summing individual items scores and dividing by the number of items.

Learning Self-Regulation Questionnaire (SRQ-L; Black & Deci, 2000). The SRQ-L is a 12-item measure designed to assess two dimensions of students' self-regulation. The Controlled Regulation subscale measures students' external motivation with 7 items (e.g., "Because others

might think badly of me if I didn't."). The Autonomous Regulation subscale measured students' intrinsic motivation with 5 items (e.g., "Because I feel like it's a good way to improve my understanding of the material"). For this study, items in the two subscales were modified to reflect students' SRL in a psychology course (e.g. "I will participate actively in organic chemistry" to "I will participate actively in psychology"). Students responded to items using a five-point Likert scale, with end points ranging from 1 (not at all true) to 7 (very true.) Cronbach's alpha for the Controlled Regulation and Autonomous Regulation subscales was computed at .51 (95% CI = .36 to .65) and .52 (95% CI = .35 to .66), respectively. Subscale scores was calculated by averaging the items in the subscale and dividing by the number of items.

Procedure

In November of 2017, the King's University College at Western University ethics review committee approved this study, indicating it met the criteria to conduct research with human participants. In January of 2018, students in Psychology 1000 courses received an email about the study. Students enrolled in the study via SONA website which provided the URL to the study's electronic questionnaire on the Qualtrics Survey tool. Students who enrolled in the study viewed a letter of information and provided consent to participate in the study. In total, the electronic questionnaire took participants approximately 45 minutes to complete. After participants completed the electronic questionnaire, Qualtrics displayed a debriefing form which described the purpose of the study and thanked students for their participation. Students received awarded up to 2.5% in bonus marks for completing a short written assignment describing the study.

Results

This study employed a cross-sectional research design to examine how university students' cognitive and metacognitive learning strategies and motivation for learning were associated with academic emotions and academic procrastination. Quantitative data from four questionnaires were employed to address the four research questions and hypotheses posed at the beginning of this study.

Research Question 1: What are the relationships among university students' cognitive and metacognitive strategies, academic procrastination, academic emotions, and, autonomy and controlled regulation?

Table 1 presents the descriptive statistics for the main variables. To answer the first research question, a series of Pearson product-moment correlations were computed (see Table 2). As expected, students' engagement in cognitive Rehearsal strategies for learning were statically significantly and positively associated with their engagement in Elaboration, $r = .41$, $p < .05$, Organization, $r = .40$, $p < .05$, and Metacognitive Self-Regulation, $r = .42$, $p < .05$. As expected, students' Rehearsal was statically significantly and positively associated with their Test Pride, $r = .21$, $p < .05$, Autonomous Regulation, $r = .43$, $p < .05$, and Controlled Regulation, $r = .28$, $p < .05$. In addition, Students' Elaboration strategies for learning were statistically significantly and positively associated with their Organization, $r = .59$, $p < .05$, Critical Thinking, $r = .50$, $p < .05$, Metacognitive Self-regulation, $r = .55$, $p < .05$, Test Enjoyment, $r = .21$, $p < .05$, Test Hope, $r = .21$, $p < .05$, Test Pride, $r = 29$, $p < .05$, Autonomous Regulation, $r = .43$, $p < .05$, and Controlled Regulation, $r = .28$, $p < .05$.

Moreover, learners' engagement in cognitive Organization strategies were statistically significantly and positively associated with their engagement in Critical Thinking, $r = .31$, p

< .05 and Metacognitive Self-regulation, $r = .59$, $p < .05$, plus their Test Hope, $r = .22$, $p < .05$, Test Pride, $r = .29$, $p < .05$, and Autonomous Regulation, $r = .23$, $p < .05$. Students' Critical Thinking strategies were statically significantly and positively related to their Metacognitive Self-Regulation, $r = .57$, $p < .05$, Test Enjoyment, $r = .26$, $p < .05$, Test Shame, $r = .20$, $p < .05$, Autonomous Regulation, $r = .25$, $p < .05$, and Controlled Regulation, $r = .29$, $p < .05$. Finally, learner's Metacognitive Self-Regulation was found to be statistically significantly and positively associated with Test Enjoyment, $r = .32$, $p < .05$, Test Hope, $r = .25$, $p < .05$, Test Pride, $r = .30$, $p < .05$, Autonomous Regulation, $r = .36$, $p < .05$, and Controlled Regulation, $r = .39$, $p < .05$.

In this study, students' Fear of Failure was statically significantly and positively associated with Test Relief, $r = .30$, $p < .05$, Test Anxiety, $r = .47$, $p < .05$, Test Shame, $r = .48$, $p < .05$, Test Hopelessness, $r = .44$, $p < .05$, and Controlled Regulation, $r = .31$, $p < .05$. Learners' Fear of Failure was statically significantly and negatively related to addition Test Hope, $r = -.25$, $p < .05$. Learner's Aversiveness of task scores were statically significantly and positively associated with Test Anger, $r = .35$, $p < .05$, Test Anxiety, $r = .23$, $p < .05$, Test Shame, $r = .31$, $p < .05$, and Test Hopelessness, $r = .35$, $p < .05$. Finally, the Aversiveness of Task variable was statistically significantly and negatively associated with Test enjoyment, $r = -.23$, $p < .05$, Test Hope, $r = -.25$, $p < .05$, Test Pride, $r = -.25$, $p < .05$, and Autonomous Regulation, $r = -.29$, $p < .05$.

Students' reports of Test Enjoyment were statistically significantly and positively associated with Test Hope, $r = .73$, $p < .05$, Test Pride, $r = .72$, $p < .05$, and Test Relief, $r = .22$, $p < .05$. In addition, Test Enjoyment had statistically significantly negative correlations with Test Anxiety, $r = -.33$, $p < .05$ and Test Hopelessness, $r = -.24$, $p < .05$. Test hope was statistically significantly and positively associated with Test Pride, $r = .60$, $p < .05$ and statistically

significantly and negatively related to: Test Anger, $r = -.21$, $p < .05$, Test Anxiety, $r = -.38$, $p < .05$, Test Shame, $r = -.29$, $p < .05$, and Test Hopelessness, $r = -.47$, $p < .05$. Test pride was statistically significantly and positively related to: Test Relief, $r = .38$, $p < .05$, Autonomous Regulation, $r = .24$, $p < .05$, and Controlled Regulation, $r = .22$, $p < .05$. Furthermore, a statistically significant and negative relationship was observed between Test Pride and Test Anxiety, $r = -.20$, $p < .05$, Test Shame, $r = -.22$, $p < .05$, and Test Hopelessness, $r = -.31$, $p < .05$.

Learners' reports of their Test Relief were statistically significantly and positively associated with: Test Anxiety, $r = .41$, $p < .05$, Test Shame, $r = .28$, $p < .05$, Autonomous Regulation, $r = .31$, $p < .05$, and Controlled Regulation, $r = .28$, $p < .05$. Test anger was statistically significantly and positively associated with Test Anxiety, $r = .46$, $p < .05$, Test Shame, $r = .70$, $p < .05$, and Test Hopelessness, $r = .71$, $p < .05$. Learners' Test Anger was statistically significantly and negatively associated with Autonomous Regulation, $r = -.22$, $p < .05$.

In addition, students' Test Anxiety was statistically significantly associated with Test Shame, $r = .68$, $p < .05$, Test Hopelessness, $r = .72$, $p < .05$ and, Controlled Regulation, $r = .31$, $p < .05$. Finally, the Test Shame variable was statistically significantly and positively associated with Test Hopelessness, $r = .79$, $p < .05$ and Controlled Regulation, $r = .27$, $p < .05$. As expected, a statistically significant and positive correlation emerged between Autonomous Regulation and Controlled Regulation variables, $r = .71$, $p < .05$.

Table 1

Descriptive Statistics for the Study Variables

	Variable	*M*	*SD*
MSLQ	Rehearsal	5.02	1.10
	Elaboration	5.10	.98
	Organization	4.87	.98
	Critical Thinking	4.10	1.05
	Metacognitive Self-regulation	4.24	.67
PASS	Fear of Failure	2.61	1.11
	Aversiveness of Task	2.95	.93
AEQ	Test Enjoyment	2.70	.67
	Test Hope	3.07	.64
	Test Pride	2.85	.72
	Test Relief	3.31	.84
	Test Anger	2.27	.77
	Test Anxiety	3.23	.99
	Test Shame	2.42	.87
	Test Hopelessness	2.36	.95
SRQ-L	Autonomous Regulation	5.13	.93
	Controlled Regulation	4.41	.78

Table 2
Correlations Among the Cognitive and Metacognitive Strategies, Academic Procrastination, Academic Emotions, and SR Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Rehearsal	1																
2.Elaboration	.41*	1															
3. Organization	.40*	.59*	1														
4. Critical Thinking	.11	.50*	.31*	1													
5. Metacognitive Self-Regulation	.42*	.55*	.59*	.57*	1												
6. Fear of Failure	-.00	.03	.03	.05	.10	1											
7. Aversiveness of Task	-.13	-.16	-.04	-.03	-.08	.17	1										
8. Test Enjoyment	.03	.21*	.17	.26*	.32*	.00	-.23*	1									
9. Test Hope	.13	.21*	.22*	.15	.25*	-.25*	-.25*	.73*	1								
10. Test Pride	.21*	.29*	.29*	.13	.30*	-.03	-.25*	.72*	.60*	1							
11. Test Relief	.19	.19	.20	.04	.11	.30*	-.06	.22*	.13	.38*	1						
12. Test Anger	-.05	-.08	.03	.18	.15	.16	.35*	-.03	-.21*	-.12	.07	1					
13. Test Anxiety	.11	-.04	.05	.05	.12	.47*	.23*	-.33*	-.38*	-.20*	.41*	.46*	1				
14. Test Shame	-.04	-.03	-.06	.20*	.13	.48*	.31*	-.10	-.29*	-.22*	.28*	.70*	.68*	1			
15. Test Hopelessness	-.14	-.15	-.13	.10	-.02	.44*	.36*	-.24*	-.47*	-.31*	.15	.71*	.72*	.79*	1		
16. Autonomous Regulation	.43*	.43*	.23*	.25*	.36*	.18	-.29*	.14	.07	.24*	.31*	-.22*	.14	.04	-.14	1	
17. Controlled Regulation	.28*	.28*	.19	.29*	.39*	.31*	-.06	.13	.01	.22*	.28*	.03	.31*	.27*	.15	.71*	1

Research Question 2: Do university students' positive academic emotions (e.g. test enjoyment, test hope, test pride, test relief) predict their metacognitive self-regulation?

To answer the second research question, a multiple linear regression analysis was computed to examine whether learners' positive academic emotions (test enjoyment, test hope, test pride, and test relief) were statistically significant predictors of their metacognitive self-regulation. Results demonstrated that the positive academic emotion variables (test enjoyment, test hope, test pride and test relief) were statistically significant and positive predictors of students' metacognitive SR, F (4, 96) = 3.01, $p < .05$, R-squared = .11, corresponding to a small effect size (d = .33; see Table 3). As shown in Table 3, learners' test enjoyment and test pride were statistically significant and positive predictors of their metacognitive self-regulation.

Table 3

Positive Academic Emotions as Predictors of Metacognitive Self-Regulation

Variable	B	SE B	β
Constant	3.24	.38	
Test enjoyment	.19	.17	.19
Test hope	.02	.15	.02
Test pride	.15	.14	.15
Test relief	.00	.08	.00

Note. $*p < .05$

Research Question 3: Do university students' negative academic emotions (e.g., test anger, test anxiety, test shame, and test hopelessness) predict their academic procrastination?

Two multiple linear regression analyses were computed to answer this research question. The first multiple linear regression examined whether the negative academic emotions (e.g. test anger, test anxiety, test shame, and test hopelessness) predicted students' fear of failure. As expected, results indicated that the negative academic emotions (test anger, test anxiety, test shame, and test hopelessness) were statically significant and positive predictors of students' fear of failure F (4, 96) = 12.35, $p \leq .001$, R-squared = .34, corresponding to a medium effect size (d = .58; see Table 4). The standardized betas that appear in Table 4, indicate that test anger and test shame were statistically significant predictors of learners' fear of failure.

Similarly, results indicated that the negative academic emotions: test anger, test anxiety, test shame, and test hopelessness were statistically significant and positive predictors of academic procrastination – aversiveness of task, F (4, 96) = 4.13, p = .004, R-squared = .15, corresponding to a small effect size (d = .39; see Table 5). Findings in Table 5 indicate that the most powerful predictors of aversiveness of task were test anger and test hopelessness.

Table 4

Negative Academic Emotions as Predictors of Academic Procrastination (Fear of Failure)

Variable	B	SE B	β
Constant	1.23	.36	
Test anger	-.59	.18	-.41*
Test anxiety	.20	.14	.17
Test shame	.61	.19	.47*
Test hopelessness	.26	.19	.22

Note. $*p < .05$

Table 5

Negative Academic Emotions as Predictors of Academic Procrastination (Aversiveness of Task)

Variable	B	SE B	β
Constant	1.98	.34	
Test anger	.21	.17	.18
Test anxiety	-.04	.13	-.04
Test shame	.00	.18	.00
Test hopelessness	.26	.18	.27

Note. $*p < .05$

Research Question 4: Do males and females differ in their use of cognitive and metacognitive learning strategies?

To answer the fourth research question, a one-way ANOVA was computed to examine whether an effect of sex was observed on students' reports of their cognitive and metacognitive learning strategies. A statically significant effect of sex was found on the cognitive elaboration variable, F (1, 99) = 4.22, $p < .05$, $\eta^2 = .04$, corresponding to a medium effect size. That is, females in this study reported statistically significantly higher levels of cognitive elaboration (M = 27.15, SD = 5.16) compared to males (M = 24.38, SD = 3.99). No other statistically significant effects were obtained on the other cognitive and metacognitive learning strategies variables.

Discussion

The purpose of the present study was to examine how university students' cognitive and metacognitive learning strategies and motivation for learning were associated with academic emotions and academic procrastination. Previous studies (Zimmernan, 2000) have demonstrated that learners' engagement in SRL is associated with deeper levels of cognitive processing and higher levels of motivation and persistence. In addition, Park and Sperling (2012) argued that procrastination interferes with learners' regulation of behaviour, cognition, and motivation. Furthermore, Pekrun et al., (2002) found that SRL was associated with high levels of emotional regulation. Findings from this study found similar results that cognitive and metacognitive strategies, academic emotions, academic procrastination, and motivation for learning were all statistically significantly correlated. Additionally, it was found that positive academic emotions predicted metacognitive self-regulation and negative academic emotions predicted procrastination. Furthermore, differences between males and females were observed in their cognitive elaboration strategies.

The first research questions asked, "what are the relationships among university students' cognitive and metacognitive strategies, academic procrastination, academic emotions, and autonomy and controlled regulation?" Results demonstrated that statistically significant correlations emerged among the study variables. In particular, these findings confirmed previous research by Morisano et al., (2010) where it was reported that motivation was associated with cognitive and metacognitive strategies. Additionally, findings from this study confirmed Park and Sperling's (2012) results that cognitive and metacognitive strategies was associated with procrastination. Together, these findings answer the first research question and was supportive of the first hypothesis. These findings contribute to the current literature by acknowledging the importance of how SRL strategies are associated with academic emotions and academic procrastination.

Results of this study answered "yes" to the second research question, "Do university students' positive academic emotions (e.g. test enjoyment, test hope, test pride, test relief) predict their metacognitive self-regulation?", indicated that positive academic emotions, particularly test enjoyment and test pride were predictors of students' metacognitive self-regulation. These findings are in line with previous research (King & Areepattamannil, 2004; Rand, 2009) indicating that when university students experience positive emotions, they are more likely to employ adaptive cognitive and metacognitive strategies for learning. These findings supported the second hypothesis. These findings extend current literature by considering the role positive emotions has on predicting self-regulating metacognition in a university setting where students are frequently engaging in cognitive and metacognitive strategies.

The third research question asked, "Do university students' negative academic emotions (e.g., test anger, test anxiety, test shame, and test hopelessness) predict their academic

procrastination?" indicated that negative academic emotions, particularly test anger and test shame were statistically significant predictors of academic procrastination (fear of failure and aversiveness of task), thus confirming the third hypothesis. A review of research indicates that academic procrastination is largely regarded as maladaptive patterns of cognition and behaviour and is associated with negative emotions (Fee & Tangney, 2000; Deniz, Tras, & Aydogan, 2009). These findings corroborate previous research which had demonstrated that negative emotions were associated with procrastination, and so with less academic satisfaction (Balkis & Duru, 2016). Findings extend current literature by examining which negative emotions (test anger and test shame) are high predictors of academic procrastination.

The final research question asked "Do males and females differ in their use of cognitive and metacognitive learning strategies?" Findings demonstrated that females utilized higher levels of cognitive elaboration strategies compared to males. These findings support the fourth hypothesis that a difference between males and females in their self-reported use of cognitive and metacognitive learning strategies would be observed. In line with previous research (Yusri, Rahimi, Shah, & Wah, 2013), findings from the present study demonstrated that females experienced higher cognitive strategies and higher motivation for learning. Research suggests that females use different strategies compared to males when using cognitive and metacognitive strategies which is why they are more likely to perform higher (Sheoroy & Mokhtari, 2001). Findings from Yusri et al., (2013) study might explain as to why findings from this study found a significant difference only in elaboration strategies not in rehearsal, organization or other cognitive strategies between males and females. Findings add to the pool of literature that males and females differ in their cognitive and metacognitive strategies, but especially in elaboration strategies, that is connecting ideas, summarizing, and paraphrasing.

Taken together, findings that emerged from this study reinforce that students' cognitive and metacognitive learning strategies, and their reasons for procrastination – including a fear of failure and aversiveness of task are associated with their academic emotions. Moreover, this study indicates that learners' academic emotions may influence the extent to which students' can harness their self-determined motivation for self-regulation. Finally, the findings reported in this provide some evidence indicating that male and female learners' use of cognitive and metacognitive strategies for learning differ. That is, in this study females outperformed males in cognitive and elaboration strategies. These findings contribute to current literature by considering more carefully the effects of positive and negative academic emotions on students' reports of their cognitive and metacognitive strategies, including rehearsal, elaboration, organization, critical thinking, and metacognitive self-regulation. In particular, results of this study suggest that negative emotions may be detrimental to the levels of procrastination, particularly in fear of failure and aversiveness of task. These findings have implications for university students to develop appropriate strategies that are discussed below.

Limitations

Results of this study should be interpreted with the following limitations in mind. A limitation of this study was unequal groups of male and female participants. Unequal samples may have created a difference between males and females in their self-reported cognitive elaboration strategies. Another limitation of this study is reliability of the SRQ-L measure. The SRQ-L had a low reliability compared to the rest of the measures used in this study. It is hypothesized that the reason this may have happened is because this was modified for the psychology course that participants were in. This means that the measure may not have accurately measured levels of autonomy and controlled regulation consistently in participants'

responses. Furthermore, a limitation for the study was using a cross-sectional design. Future research should use longitudinal research methods to observe trends or patterns in students' SRL, academic emotions, and academic procrastination over time.

Future Research

Findings from this study point to research in three areas. First, future research should examine students' academics and emotions in university over the long term to identify patterns of learning and emotions. Collecting data about motivation, cognition, emotions and procrastination at different points throughout the academic year could lend more of an understanding of the results found in this study. For example, why negative academic emotions predict procrastination and if it will predict over time. Furthermore, future research should examine if procrastination can be a beneficial learning strategy by measuring active and intentional procrastination. This is the type of procrastination where individuals prefer to work under pressure and deliberately procrastinate. Previous research examined how active procrastination helps students be motivated, stay on task, and have enhanced concentration if there is limited amount of time before a due date (Park & Sperling, 2012). This research may support the idea that procrastination can be an adaptive strategy for students who need pressure to perform in university. This would be interesting to see how this type of procrastination is predicted in comparison to the maladaptive procrastination that was evaluated in this study. A third area of research that should be considered includes meditation strategies. Mindfulness is a strategy that may help students cope with negative emotions that they are experiencing in university (Hill & Updegraff, 2012). Therefore, future research should examine if mindfulness meditation strategies can assist with SRL in regulating academic emotions.

Implications

Findings from this research have implications for teaching and for learning. SRL is associated with well-being, higher levels of learning and academic achievement (Zimmerman, 1999). Results of this study highlight the need to consider cognitive and metacognitive learning strategies and how negative academic emotions influence these strategies. This is supported by this study which shows how highly influential positive and negative academic emotions play in university students' learning. Supporting learners to continue to develop adaptive and effective emotional regulation strategies seem critical for supporting learners' development of cognitive and metacognitive learning strategies. A growing body of research provides some evidence indicating that mindfulness may be an effective strategy for supporting individuals to regulate emotions and decrease negative affect such as anger and shame (Hill & Updegraff, 2012). Teaching students strategies for regulating emotions may be particularly useful in academic situations as they can interfere with learners' engagement in adaptive cognitive and metacognitive learning strategies. Students who learn to regulate negative emotions may experience higher levels of academic engagement, motivation and self-determination, and that in turn, may enhance academic achievement.

In the final analysis, this study provided useful information about SRL in university students by examining students' cognitive and metacognitive strategies and motivation to identify their association with academic emotions and academic procrastination. The most significant findings were that students' cognitive and metacognitive strategies, motivation for learning, academic emotions, and academic procrastination all correlated. In addition, that metacognitive self-regulation was predicted by academic emotions. Moreover, that negative academic emotions predicted procrastination. Last, that cognitive elaboration strategies differed

between sexes, with females performing higher than males. This study was unique because it placed importance in examining many variables that make up university learning and how they are all connected. In addition, how important the role of emotions is on SRL and how differences may exist between males and females in their cognitive and metacognitive learning strategies. Altogether, university students should be encouraged to practice emotional regulation, such as meditation and adaptive behaviours, such as self-care to maximize university learning and academic success.

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Appendix A

Demographic Form

1. What is your sex? (please check one) _____ Male _____ Female
2. What is your date of birth? (MM/DD/YYYY)

   _____/_____/_____
3. What is your ethnic background?

   _____ White
   _____ Aboriginal/First Nations/Métis
   _____ Chinese
   _____ South Asian
   _____ Black
   _____ Filipino
   _____ Latin American
   _____ Southeast Asian
   _____ Arab
   _____ West Asian
   _____ Japanese
   _____ Korean
   _____ Pacific Islander
   _____ Other (Please Specify) _____
4. What is your year of study?

   1st Year_____ 2nd Year_____ 3rd Year_____ 4th Year_____ Other_____
5. What is your current major? What field/area do you intend to major in?

   Current Major _____ Intend to major in _____