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A Correlational Study of Self-Regulated Learning, Stress and Mindfulness In Undergraduate Students

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Abstract

The present study examined relationships among mindfulness, self-regulated learning (SRL), and perceived stress. This study was part of a larger project investigating longitudinal relationships between undergraduate students' mindfulness and SRL. Data were gathered from 108 undergraduate students (73 female; Mean Age = 20.96 years, *SD* = 5.97 years) who were attending university at a small liberal arts college in London, Canada. Students completed an electronic questionnaire containing items that measured SRL, perceived stress, and dispositional mindfulness. A series of regression analyses were computed to examine whether dispositional mindfulness mediated the relationship between stress and SRL. Results demonstrated that (a) stress was a statistically significant and negative predictor of mindfulness ($\beta = -.61$, $t\ (104) = -5.07$, $p < .001$), (b) mindfulness was a statistically significant and positive predictor of SRL ($\beta = .24$, $t\ (104) = 3.04$, $p = .003$), (c) perceived stress was a statistically significant negative predictor of SRL ($\beta = -.31$, $t\ (104) = -3.13$, $p = .002$). Findings demonstrated that in the presence of mindfulness, stress was not a statistically significant predictor of SRL ($\beta = -.17$, $t\ (104) = -1.55$, *ns*). Results of the bootstrapping analysis provided evidence indicating that mindfulness partially mediated the relationship between stress and SRL ($\beta = -.14$, CI = -.27 to -.07). The implications of these results are discussed, including the possibility that promoting mindfulness may support SRL and reduce stress for undergraduate students.

This thesis is dedicated to Patricia and David Trevisani. Thank you for continually inspiring me every day.

A Correlational Study of Self-Regulation, Mindfulness and Stress

In Undergraduate Students

Self-Regulated Learning

Self-regulation (SR) describes how individuals utilize basic executive functioning processes (i.e., working memory, behavioural inhibition, and attention focusing) plus higher-level cognitive processes (i.e., metacognition, motivation, and strategic action) to respond to features of their environments and achieve goals (Hutchinson & Perry, under review; Zimmerman, 2008). In Educational Psychology, researchers describe SR as self-regulated learning (SRL), which refers to independent and effective approaches to learning, and academic achievement that requires metacognition, motivation, and strategic action to achieve academic goals. Learners are metacognitive when they use knowledge of their individual strengths and weaknesses to, for example, select appropriate peers or colleagues to work with on a collaborative task (Zimmerman, 2002). Motivation for learning involves self-efficacy (i.e., individuals' confidence in themselves to achieve a goal; Sitzmann & Ely, 2011), attributions, and goal orientations (Schunk, 1990). Motivation is observed when students persist on difficult learning tasks. Strategic action is the behavioural manifestation of learners' metacognition and motivation. Learners engage in strategic action when they are observed seeking help from more capable teachers or peers to better understand course material (Sitzmann, & Ely, 2011; Zimmerman, 2002).

Studies have indicated that learners' engagement in SRL is related to a host of positive academic outcomes such as: better goal setting, greater levels of learning compared to peers who do not use SRL and higher grades (Eom, 1999; Winne, 1997; Zimmerman, 2008). For example, Schunk (1990) examined data gathered from a sample of elementary school students and

undergraduate students. In both samples, they found that students who were given both challenging goals and rewards were the most successful at completing tasks carefully and in a timely fashion. In particular, results indicated that undergraduate students who were given challenging learning goals were more likely to set challenging goals when given a similar task. Finally, results demonstrated that students who were given feedback from the instructor about their work and learning performed better on the task and instructor feedback was a statistically significant predictor of students' effort to accomplish the task (Schunk, 1990; Sitzmann & Ely, 2011). These results demonstrate that it is important for students to develop SRL to succeed in school (Lopez, Nandagopal, Shavelson, Szu, & Penn, 2013).

SRL is contrasted with maladaptive and defensive patterns of learning (Paris & Paris, 2001). Students who have trouble with SRL tend to experience more negative learning outcomes such as higher procrastination and lower self-efficacy (Strunk & Steele, 2011). For example, Strunk and Steele (2011) gathered data from undergraduate students to examine the relationship between self-efficacy, SRL, self-handicapping and procrastination in undergraduate students. Results indicated that self-efficacy was a statistically significant and negative predictor of procrastination. Findings demonstrated that SR was a statistically significant and positive predictor of self-efficacy and a negative predictor of maladaptive patterns of learning such as procrastination tactics and self-handicapping (Strunk & Steele, 2011). Together, these findings indicate that students who have low SRL also tend to have low self-efficacy and are more likely to engage in procrastination and self-handicapping which in turn leads to lower levels of academic achievement (Sitzmann & Ely, 2011; Strunk & Steele, 2011).

Some research in Educational Psychology has focused on understanding relationships between SRL and individual academic learning stressors (e.g., learners' test anxiety) as well as

SRL and classroom level learning stressors (e.g., high stakes/threatening forms of evaluations; Kadzikavska-Wrzosek, 2012). In general, these studies have found that high levels of individual and classroom learning stressors are negatively associated with students' development of and engagement in SRL (University of New York Attrition Study, 2005). A review of the literature indicates that the majority of studies about SRL involve students in high school and university. However, studies have not attended to understanding how undergraduate students' SRL is linked to non-academic life stressors. Therefore, the purpose of the present study was to examine relationships between SRL and perceived stress in undergraduate students.

Stress

Stress refers to an individual's interpretation of an occurrence where "he or she believes that there is a discrepancy between the demands of the situation and the available psychosocial resources and competences" (Kadzikavska-Wrzosek, 2012, p. 25). Research has demonstrated that high levels of stress are linked with increased production of cortisol. High levels of cortisol have been linked to poor physical health including: heart disease, diabetes, and osteoporosis (Kadzikacaska-Wrzosek, 2012). Also, studies have demonstrated that stress is associated with a host of negative psychological consequences including anxiety, insomnia, social dysfunction, depression and impaired executive functioning (Kadzikavska-Wrzosek, 2012). Researchers indicate that high levels of cortisol impede cognitive functioning in the prefrontal cortex region of the brain and as a result, executive functions suffer (Orem et al., 2008). Hence, individuals who experience high levels of stress tend to experience difficulties with memory, and self-control (Diamond, 2013). Given that executive functions assist with SRL, it seems likely that stress may also impede learners' engagement in SRL.

In their research, Orem et al., (2008) examined students' self-reported levels of perceived

stress and their ability to complete Trials 3 and 5 of the comprehensive trail-making test (CTMT), which requires the utilization of executive functions. Results of this study demonstrated a statistically significant and positive relationship between perceived stress, as measured by the Perceived Stress Scale, (Cohen, Kamarck, & Mermelstein, 1983), and Trial 5 of the Comprehensive Trail Making Test (CTMT), which measures basic executive functioning skills – working memory, behavioural inhibition, and attention focusing. Findings demonstrated that higher levels of perceived stress inhibited students' abilities to utilize executive functioning skills like generating strategies for complex action, following through with plans and overriding emotional responses to engage in goal-directed behaviours (Orem et al., 2008; Williams, Suchy & Rau, 2009).

Recently, the Canadian Association of College and University Health Services (2013) reported that students define academics as the top cause of stress in undergraduate students' daily lives. High levels of perceived stress have been associated with lower levels of academic performance and student engagement (University of New York Attrition Study, 2005). Recent research indicates that students in different years of study experience varying stress levels (Zascavage et al., 2012). Researchers Zascavage et al., (2012) conducted a study that asked undergraduate and graduate students to complete a questionnaire relating to their daily stress levels. Findings demonstrated that senior undergraduate students and graduate students reported statistically significantly lower levels of stress compared to students enrolled in their first three years of undergraduate study. In their study, first year students reported the highest levels of stress. The researchers concluded that age had an impact on an individuals' ability to deal with stress. Results demonstrated that older students were better equipped to deal with stress and coped most successfully when dealing with stressful situations compared to younger students

(Zascavage et al., 2012).

Taken together, studies have demonstrated that high levels of stress can impair executive functioning (Orem et al., 2008; William, Suchy & Rau, 2009) Also, some research indicates that undergraduate students experience a high level of stress in their first year of undergraduate studies (Zascavage et al., 2012). The current study examines how undergraduate students' perceived stress is related to SRL, and whether older undergraduate students report lower levels of stress compared to younger undergraduate students.

Mindfulness

Over the last decade, the study of mindfulness has garnered empirical attention in the health psychology literature. As a result, many definitions of the term have been proposed (Bishop, et al., 2004; Palmer & Rodger, 2009). For example, Buddhists refer to mindfulness as individuals' abilities to observe the events that unfold around oneself without judgment or obstruction (Goldstein, 2002). As well, Brown and Ryan (2003) introduced the psychological study of mindfulness and its relationship to well-being and defined it as "the state of being attentive to and aware of what is taking place in the present" (p. 822). Similarly, mindfulness has been defined as being actively aware of one's thoughts and actions (Lawlor, Schonert-Reichl, Gadermann & Zumbo, 2013). Consistent with the definitions proposed by Lawlor et al (2013) and Brown and Ryan (2003), the present study defines mindfulness as individuals' engagement in conscious attention to activities and events taking place in the present moment.

Research has demonstrated that mindfulness is linked to individuals' physical health and psychological well-being (de Vibe et al., 2013; Lawlor et al., 2013). Specifically, high levels of mindfulness are associated with higher levels of well-being including lower levels of stress, high levels of optimism and happiness, and self-actualization (Lawlor et al., 2013). For example, de

Vibe et al., (2013) employed an experimental design to assess whether a mindfulness intervention had an effect on students' health, mindfulness, perceived stress, subjective well-being, and burnout. Students were randomly assigned to the control or intervention group and a series of self-report measures assessing students' general health, mindfulness, perceived stress, subjective well-being and burnout were administered. Participants in the intervention group received six weekly sessions of mindfulness training and were required to practice 30 minutes of mindfulness at home each evening. Results of this study indicated that mindfulness had a statistically significant positive relationship with subjective well-being. In other words, female students who were involved in mindfulness training reported lower levels of mental distress and higher overall well-being, regardless of their field of study. These results have been corroborated by the work of Palmer and Rodger (2009) and more recently by Di Bacco and Hutchinson (2014) who have found that university students who report higher levels of mindfulness also report lower levels of perceived stress.

By contrast, lower levels of mindfulness have been associated with poor psychological health and well-being (Bahl, Milne, Ross & Chan, 2013). For example, Bahl et al., (2013) investigated how students' practices of mindful attention are associated with their level of mindless and unhealthy eating behaviours as well as stress during undergraduate studies. Results of their research have indicated that lower levels of mindful attention are associated with carelessness, inattention, higher levels of mindless eating and overall lower well-being. For undergraduate students, feeling preoccupied with future deadlines or exams can negatively impact current well-being and productivity, subsequently, increasing stress and unhealthy eating behaviours (Bahl et al., 2013). Overall, active mindfulness during academic pursuits results in more positive outcomes in well-being and stress compared to mindless attention.

To date, research has demonstrated the positive effects of mindfulness as a way of decreasing stress and improving executive functioning (Jha et al., 2007; Orem et al., 2008). A challenge for researchers is to examine how mindfulness is related to SRL. In a recent study done by Jimenez, Niles and Park (2010), the relationship between an individual's levels of dispositional mindfulness and depressive symptoms was investigated where affect regulation, including emotional regulation, mood regulation and self-regulation were proposed to explain part of the relationship between the variables. The researchers investigated how positive emotions, mood regulation and self-acceptance, all variables of affect regulation, were associated with dispositional mindfulness and in turn, depressive symptoms. Findings suggested that mindfulness was positively and statistically significantly correlated with self-acceptance, positive emotions and mood regulation and negatively associated with depressive symptoms. Further, students who reported higher levels of affect regulation, specifically self-acceptance, often reported higher mindfulness and fewer depressive symptoms (Jimenez et al., 2010). This result indicates the important role mindfulness plays in both increasing self-regulatory skills as well as increasing positive affect and well-being.

Summary and Research Questions

A review of the literature indicates that SRL is associated with positive educational outcomes (Eom, 1999; Lopez et al., 2013; Schunk, 1990; Sitzmann & Ely, 2011; Stoeger & Ziegler, 2008; Strunk & Steele, 2011; Winne, 1997; Zimmerman, 2008). Some studies have linked individual and classroom level stressors to lower levels of students' SRL. Research has indicated that high levels of stress impair executive functioning (Diamond, 2013). Also, research demonstrates that mindfulness reduces the effects of stress on executive functioning (de Vibe et al., 2013; Lawlor et al., 2013). Therefore, it seems likely that mindfulness may also reduce the

effects of stress on SRL (Schunk, 1990; Sitzmann & Ely, 2011). With the exception of Di Bacco and Hutchinson (2014), very few studies have examined the links between SRL, stress, and mindfulness. Therefore, the purpose of the present study was to examine relationships among SRL, stress, and mindfulness in undergraduate students. This study posed three research questions and tested three hypotheses:

1. What is the magnitude of the relationships among the main study variables?
    - It was hypothesized that stress would be negatively associated with SRL and mindfulness, respectively. Also, it was hypothesized that SRL would be positively related to mindfulness.
2. Does age predict students' perceived stress?
    - It was hypothesized that older students would report lower levels of perceived stress overall as well as higher levels of mindfulness and self-regulated learning.
3. Does dispositional mindfulness mediate the relationship between perceived stress and SRL?
    - It was hypothesized that mindfulness will partially mediate the relationship between perceived stress and SRL.

Method

Design

A correlational research design was employed to examine the research questions and hypotheses posed in this study.

Participants

Data were collected from 108 undergraduate students (73 females; 35 males; M = 20.96 years, SD = 5.98 years) who were enrolled at King's University College in London, Canada. For

this study, participants' ethnic backgrounds were grouped according to the United Nations' regions of the world. In this sample 68% of students indicated they were from Western European background; 19% were from an Asian Pacific background; 8% were from Latin American or Caribbean background; 2% of students were from an African background; and 3% reported their ethnicity as "Other".

Measures

Qualtrics Survey Tool. Qualtrics Survey Tool is hosted on the Western University website with a secure server based at the Western University campus. Qualtrics Survey Tool software allows researchers to create and administer electronic questionnaires using the Internet. For this study, the researcher used Qualtrics Survey Tool to create an electronic questionnaire template and enter survey items. After each item was entered, the researcher customized the response scale that accompanied each survey item. The completed questionnaire was uploaded to the Western University server so it could be electronically distributed to potential participants.

Demographic information form. Demographic data were collected using the form that appears in Appendix A. This form asked participants to indicate their sex, birth date, ethnicity, year of study, and major.

Self-Regulation In School Inventory. In the present study, a modified 17-item version of the Self-Regulation In School Inventory (SRISI; Hutchinson & Di Bacco, 2014) was employed to assess students' SRL (see Appendix B). Items on the SRISI measure learners' metacognition, emotions and motivation, and strategic action for SRL (e.g., "I make realistic evaluations of my academic task performances"; Item 1) Participants responded to items using a seven-point Likert scale with endpoints ranging from 1 (almost never) to 7 (almost always).

Cronbach's alpha for this measure was computed at .79 (95% CI = .72-.82). A mean score of SRL was computed by summing the individual item scores and dividing by the number of items.

Mindfulness Attention Awareness Scale. Dispositional mindfulness was measured using the Mindfulness Attention Awareness Scale (MAAS; Brown & Ryan, 2003). The MAAS (Appendix C) contains 15 items that measure how individuals shift and focus their attention on the present moment (e.g., "I could be experiencing some emotion and not be conscious of it until sometime later"; Item 1). Participants respond to items using a 6-point Likert scale with endpoints ranging from 1 (almost always) to 6 (almost never). Cronbach's alpha of internal consistency was computed at .89 (95% CI = .85 - .91). An average score of mindfulness was computed by aggregating individual item scores and dividing by the number of items.

Perceived Stress Scale. Undergraduate student stress was measured using the 10-item Perceived Stress Scale (PSS; Cohen, 1983; see Appendix D). Participants rated how often they felt or thought a certain way in the last month (e.g., "In the last month, how often have you felt that you are unable to control the important things in your life?") using a 5-point Likert scale with endpoints ranging from 0 (never) to 4 (very often). Cronbach's alpha was computed at .89 (95% CI = .85 to .91). An average score of stress was calculated by summing item scores and dividing by the number of items.

Motivated Strategies for Learning Questionnaire. The Motivated Strategies for Learning Questionnaire (MLSQ; Pintrich & DeGroot, 1990; see Appendix E) is an 81-item self-report measure designed to assess undergraduate students's motivation and learning strategies. The MLSQ (Pintrich & DeGroot), measures 15 aspects of student learning: the subclass are: Intrinsic Goal Orientation, Extrinsic Goal Orientation, Task Value, Control of Learning Beliefs, Self-efficacy for Learning and Performance, Test

Anxiety Performance, Rehearsal, Elaboration, Organization, Critical Thinking, Self-Regulation, Time and Study Environment, Peer Learning, and Help Seeking. The present study employed three subscales from the MLSQ to measure students' intrinsic and extrinsic motivation for learning, metacognition for learning, and effort (described below).

***Motivation*.** Two dimensions of motivation were examined in this study. Four items measured extrinsic goal orientation (e.g., "In a class like this, I prefer course material that really challenges me so I can learn new things"; α= .73, 95% CI = .63 to .80) and four items measured intrinsic goal orientation (α = .66, 95% CI = .55 to .70; e.g., "Getting a good grade in this class is the most satisfying thing for me right now"; Item 5).

Metacognition for Learning. A total of 13 items were used to measure undergraduate students' metacognition for learning (e.g., "When reading for this course, I make up questions to help focus my reading."; Item 10). Cronbach's alpha for this subscale was computed at .67 (95% CI = .57 to .70).

Effort. There were 4 items that measure students' effort for learning (e.g., "I work hard in class even if I don't like what we're doing."; Item 23). Cronbach's alpha for this subscale was computed at .74 (95% CI = .64 to .81)

Participants responded to the items using a 7-point Likert scale with endpoints ranging from 1 (not at all true of me) to 7 (very true of me). A mean score was computed for the motivation, metacognition for learning, and effort subscales by aggregating individual item scores and dividing by the number of items.

Procedures

In November 2014, I attended my supervisor's Psychology 1000 classes to describe my study to potential participants. I circulated sign-up sheet that invited students to enroll in the study by providing their email address (see Appendix F). Also, Psychology 1000 students could enroll in the study by registering their email address on the SONA website. In December 2014 I logged into Qualtrics Survey Tool and distributed an email containing the questionnaire URL to potential participants (see Appendix G). When students navigated to the survey home page, they were presented with the consent form that described the study and their involvement in it (Appendix H). Students who participated in the study began the survey by completing some demographic information questions (e.g., birth date, sex, and ethnicity). Then, participants answered a series of questions about their SRL, stress, mindfulness, and motivation for learning. After participants completed the survey, they were provided with a URL that linked them to a debriefing form (see Appendix I). Psychology 1000 students who participated in this study had the opportunity to receive 2.5% bonus credit toward their course grade for completing the online survey and a supplementary assignment.

Results

Results are presented in order of the research questions posed at the outset of this study.

What is the Magnitude of the Relationships Among the Main Study Variables?

The descriptive statistics for the main study variables (i.e. SRL, mindfulness, perceived stress) appear in Table 1. To answer the first research question, a series of Pearson product-moment correlations were computed (Table 2). Findings indicated that a statistically significant and positive relationship was observed between SRL and mindfulness. Also, a statistically significant and negative relationship was found between

perceived stress and SRL and perceived stress and mindfulness. Further, a statistically significant and positive correlation was found between SRL and the three subscales from the MLSQ - extrinsic motivation, metacognition for learning and effort self-regulation. These findings provide evidence of concurrent validity of the modified SRISI measure. These findings confirmed the hypothesis that mindfulness and SRL were positively and statistically significantly correlated. Finally, results confirmed the hypothesis that perceived stress would be negatively and statistically significantly related to SRL and mindfulness, respectively.

What Is the Relationship Between Age and Perceived Stress?

A bivariate regression analysis was conducted to examine whether the continuous variable age predicted students' perceived stress. Findings demonstrated that age was a statistically significant and negative predictor of students' perceived stress, F (1,104) = 5.24, p = .02, R =.22, indicating a small to medium effect (Table 3). In other words, older students reported lower levels of perceived stress.

Does Dispositional Mindfulness Mediate the Relationship Between Perceived Stress and SRL?

A series of four multiple regression analyses were performed in SPSS version 22 using the Preacher and Hayes (2008) mediation macro. These analyses were computed to examine whether mindfulness mediated the relationship between perceived stress and SRL (see Figure 1). To test path A, a multiple regression analysis was conducted using perceived stress and age as the predictor variable and mindfulness as the criterion variable. Results indicated that stress was a direct, statistically significant and negative predictor of mindfulness in the presence of age (β = -.61, t (104) = -5.07, p < .001). Path

B was tested using a multiple regression analysis; mindfulness and age were employed as the predictor variables, and SRL was employed as the criterion variable. Results demonstrated that mindfulness was a direct, statistically significant and positive predictor of SRL when controlling for the effects of age ($\beta = .24$, $t\ (104) = 3.04$, $p = .003$). To investigate path C, a multiple regression was computed where perceived stress and age were the predictor variables and SRL was the criterion variable. Findings demonstrated that perceived stress was a statistically significant and negative direct predictor of SRL even in the presence of age ($\beta = -.31$, $t\ (104) = -3.13$, $p = .002$). Finally, path C' was investigated using a multiple regression analysis where mindfulness, age and perceived stress were the predictor variables and SRL was the criterion variable. Findings demonstrated that in the presence of mindfulness and age, stress was not a statistically significant predictor of SRL ($\beta = -.17$, $t\ (104) = -1.55$, *ns*).

Given the results that paths A, B, and C were statistically significant, and the C' path was not statistically significant, the bootstrapping method was employed to examine the bias-corrected confidence intervals (Preacher & Hayes, 2008). In the current sample, the 95% confidence interval was obtained for the indirect effect with 1000 bootstrap samples. Results of the mediation analysis confirmed that mindfulness was a partial mediator of the relationship between perceived stress and SRL ($\beta = -.14$, CI = -.26 to -.07.

Discussion

Results of this study indicated that SRL and mindfulness were positively related. In other words, higher levels of dispositional mindfulness were associated with higher levels of SRL. This finding contributes to the literature by supporting previous research that has indicated

students' with higher levels of mindfulness often report high levels of self-regulation (Jimenez et al., 2010). Further, it contributes to the literature by investigating the relationship between dispositional mindfulness and a specific aspect of self-regulation, namely SRL, which, aside from the research done by Di Bacco and Hutchinson (2014) is not present in the literature.

Findings from this study demonstrated that perceived stress was negatively associated with SRL (Orem et al., 2008) and dispositional mindfulness (Vibe et al., 2013). This corroborates previous literature that has indicated that high levels of stress, including higher levels of the hormone cortisol, are negatively associated with executive functioning processes including the high-level process of SRL (Orem, et al., 2008). Further, previous research has demonstrated that low levels of mindfulness are associated with negative outcomes, including higher levels of perceived stress and inattention (Bahl et al., 2013).

This study examined whether the demographic variable age was related to perceived stress. Results indicated that older students reported lower levels of perceived stress. This finding supports previous research that has indicated that undergraduate students in their first year of study report higher levels of stress compared to senior undergraduates and graduate students (Zascavage et al., 2012). This finding invites future research to investigate whether and how mindfulness and SRL skills mature as students age. Moreover, research which focuses on understanding how children learn and develop mindfulness and SRL could illustrate how these skills may mitigate the negative effects of perceived stress on achievement. For example, Schonert-Reichl and Lawlor (2010) found that students who engaged in a Mindfulness Education (ME) program showed increased levels of optimism from pretest to post-test. Further, students who engaged in the ME program showed higher teacher-rated levels of social competent behaviour demonstrating the benefits of mindfulness training on various dimensions of self-

regulation, including SRL and emotional regulation. More studies are needed to examine whether and how mindfulness (e.g., Schonert-Reichl & Lawlor, 2010) and SRL (e.g., Perry, 1998; Hutchinson, 2013) interact during the early, middle, and later years of school.

Finally, this study tested whether dispositional mindfulness mediated the relationship between stress and SRL. Findings demonstrated that in the presence of dispositional mindfulness, perceived stress did not have a statistically significant relationship with SRL. This finding contributes to the literature indicating that dispositional mindfulness may alter the impact that perceived stress has on students' SRL.

Limitations

Some limitations of the present study should be considered when interpreting the findings reported above. A first limitation of this study is the sample characteristics of the participants involved in this study. Participants were self-selected undergraduate university students and because of this specific sample composition, results of this study may not be generalizable to a larger population, which would extend beyond undergraduate students. A second limitation of this study is the research design employed. Specifically, this study utilized a correlational research design resulting in an inability to make causal inferences from this study. Finally, the data in this study consisted solely of students' self-reports of SRL, stress, and dispositional mindfulness.

Future Research

The findings presented in this study point to future research in at least two core areas. First, longitudinal research is needed to examine trajectories of undergraduate students' SRL, dispositional mindfulness, and perceived stress. Second, future work is needed to examine whether and how mindfulness and SRL are linked to higher levels of physical health and well-

being by reducing the potentially negative impact that stress can have on undergraduate students. Together, these recommendations will lead to an understanding of how SRL, mindfulness and perceived stress continue through undergraduate studies. Further, by examining how SRL and mindfulness contribute to higher levels of health, interventions can be put into place to promote these processes and subsequently, increase individuals' academic achievement and well-being.

Implications

The two core recommendations for future work provide theoretical and practical implications. Theoretically, results point to the need to explain the role of mindfulness in basic executive functioning processes (i.e., working memory, behavioural inhibition, and attention focusing) and higher order processes (metacognition, motivation for learning and strategic action). Also, practically, mindfulness practices could be implemented in classrooms to help promote mindfulness and in turn, reduce students' perceived stress. Implementing mindfulness practices in lower grades of education may help reduce levels of stress experienced by students as they navigate their educational trajectories.

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Table 1

Descriptive Statistics for the SRL, Mindfulness and Perceived Stress Variables (N =108)

Variable	*M (SD)*	Min to Max	Skewness (*SE*)	Kurtosis (*SE*)
1. SR	5.25 (.65)	3.12-6.65	-.64 (.23)	.85 (.46)
2. Mindfulness	3.70 (.81)	1.73-5.33	-.33 (.23)	-.50 (.46)
3. Perceived Stress	2.45 (.59)	1.10-4.20	.23 (.23)	-.40 (.46)

Table 2

Intercorrelations between the Self-Regulated Learning, Mindfulness, Perceived Stress and Motivated Strategies for Learning Variables (N=108)

Variable	1	2	3	4	5	6	7
1. SRL	-						
2. Mindfulness	0.31**	-					
3. Perceived stress	-0.28**	-0.47**	-				
4. Extrinsic motivation	0.49**	0.17	-0.08	-			
5. Intrinsic motivation	0.02	0.06	-0.01	0.05	-		
6. Metacognition for learning	0.52**	0.18	-0.09	0.41**	-0.01	-	
7. Effort self-regulation	0.32**	0.50**	-0.24*	0.23*	-0.05	0.48**	-

Note. * $p < .05$, ** $p < .001$. Correlations should be interpreted using the following effect size guidelines whereby: 0.1 (small effect), 0.3 (medium effect), 0.5 (large effect).

Table 3

Bivariate Regression Analysis of Age Predicting Perceived Stress (N = 108)

Model	*Unstandardized B*	*Standardized beta*	*t*	*p*
Age	-.02	-.22	-2.3	.02

Figure 1

Mediation Path for SRL, Mindfulness and Perceived Stress

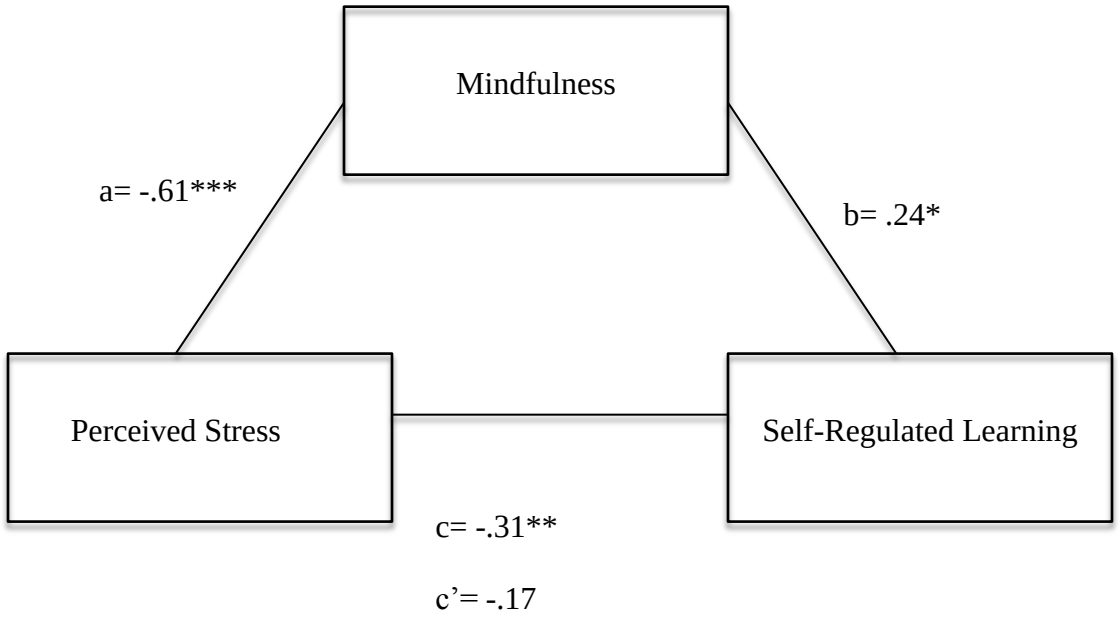

Figure 1: Mediation Model of Perceived Stress, Self-regulation and Mindfulness
Note: $*p < .05$, $**p < .005$, $***p < .001$

Appendix A
Demographic Information

1. What is your sex? (Please Check One)
   Male
   Female

2. What is the month, date and year of your birth? (MM/DD/YYYY)

_____ /_____ / _____

3. How would you identify your ethnic background (check one or more of the following)?

___ 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 major?

_____

Appendix B
Self-Regulation In School Inventory-Adult (Hutchinson, 2014)

1. I make realistic evaluations of my performance on a task.

2. I offer to refer my colleagues to information/books that assist that them with a project or task.

3. I enjoy learning about new fields of research, study, or theories.

4. I recognize how much support my colleagues need for their learning.

5. I am able to communicate an accurate understanding of others' ideas and perspectives when discussing a group project/task.

6. I take responsibility for learning successes and failures by attributing them to factors I can control (e.g., working harder, trying a new strategy).

7. I communicate my emotions effectively.

8. I offer instrumental support to peers who are struggling with academic tasks (e.g., sharing lecture notes, offering them a course website to find resources).

9. When I become overwhelmed by a difficult academic task, I adjust my expectations for learning success.

10. I understand how I can achieve on academic tasks.

11. I discuss my academic tasks with my professor when they are difficult rather than becoming overwhelmed by them.

12. I retain confidence in my learning skills and abilities even after making mistakes.

13. I adjust my feedback and support to support my peers' particular learning needs.

14. I manage a set of directions to complete tasks independently.

15. I will choose a quiet space to work if others are disruptive.

16. I have something positive to say about my learning even when I am disappointed because I didn't do well on an assignment or test.

17. I engage in positive self-task or other productive strategies when I am faced with challenging or upsetting situations, rather than letting negative emotions get in the way.

Appendix C

Mindfulness Attention Awareness Scale

1. I could be experiencing some emotion and not be conscious of it until some time later.
2. I break or spill things because of carelessness, not paying attention, or thinking of something else.
3. I find it difficult to stay focused on what's happening in the present.
4. I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.
5. I tend not to notice feelings of physical tension or discomfort until they really grab my attention.
6. I forget a person's name almost as soon as I've been told it for the first time.
7. It seems I am "running on automatic," without much awareness of what I'm doing.
8. I rush through activities without being really attentive to them.
9. I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.
10. I do jobs or tasks automatically, without being aware of what I'm doing.
11. I find myself listening to someone with one ear, doing something else at the same time.
12. I drive places on 'automatic pilot' and then wonder why I went there.
13. I find myself preoccupied with the future or the past.
14. I find myself doing things without paying attention.
15. I snack without being aware that I'm eating.

Appendix D

Perceived Stress Scale

1. In the last month, how often have you been upset because of something that happened unexpectedly?

2. In the last month, how often have you felt that you were unable to control the important things in your life?

3. In the last month, how often have you felt nervous and "stressed"?

4. In the last month, how often have you felt confident about your ability to handle your personal problems?

5. In the last month, how often have you felt that things were going your way?

6. In the last month, how often have you found that you could not cope with all the things that you had to do?

7. In the last month, how often have you been able to control irritations in your life?

8. In the last month, how often have you felt that you were on top of things?

9. In the last month, how often have you been angered because of things that were outside of your control?

10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

Appendix E

Motivated Strategies For Learning Subscale

Motivation

Extrinsic Goal Orientation Items

1. In a class like this, I prefer course material that really challenges me so I can learn new things.

2. In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.

3. The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.

4. When I have the opportunity in this class, I choose course assignments that I can learn from even if they don't guarantee a good grade.

Intrinsic Goal Orientation Items

5. Getting a good grade in this class is the most satisfying thing for me right now.

6. The most important thing for me right now is improving my overall grade point average, so my main concern in this class is getting a good grade.

7. If I can, I want to get better grades in this class than most of the other students.

8. I want to do well in this class because it is important to show my ability to my family, friends, employer, or others.

Metacognition Self-Regulation Items

9. During class time I often miss important points because I'm thinking of other things. (reverse coded).

10. When reading for this course, I make up questions to help focus my reading.

11. When I become confused about something I’m reading for this class, I go back and try to figure it out.

12. If course readings are difficult to understand, I change the way I read the material.

13. I try to work with other students from this class to complete course assignments.

14. Before I study new course material thoroughly, I often skim it to see how it is organized.

15. I ask myself questions to make sure I understand the material I have been studying in class.

16. I try to change the way I study in order to fit the course requirements and instructors teaching style.

17. I often find that I have been reading for this class but don't know what it all about (reverse coded).

18. I try to think through a topic and decide what I am supposed to learn from it rather than reading it over when studying for this course.

19. When studying for this course I try to determine which concepts I don't understand well.

20. When I study for this class, I set goals for myself in order to direct my activities in each set period.

21. If I get confused taking notes in class, I make sure I sort it out afterwards.

Effort Self-Regulation

22. I often feel so lazy or bored when I study for this class that I quit before I finish was I had planned to do (reverse coded).

23. I work hard to do well in class even if I don't like what we are doing.

24. When course work is difficult, I either give up or only study the easy parts (reverse coded).

25. Even when course materials are dull and uninteresting, I manage to keep working until I finish.

Appendix F
Sign Up Poster

A longitudinal study of self-regulation, mindfulness, motivation and stress in undergraduate students.

You must be a part of a Psychology 1000 class at King's University College to participate in this study.

Participation in this study requires you to complete an online survey. The surveys will consist of brief sentences in which you are required to report your level of agreement to each statement.
One questionnaire will ask about your perceived level of mindfulness. The second questionnaire has to do with self-regulation and the final questionnaire deals with stress levels experienced during university.

Participation in the study is expected to take less than one hour.
Psychology 1000 students can receive up to 2.5% bonus marks for completing a related assignment.
Participants are free to withdraw at any time and still receive credit for the written assignment.

Appendix G
Recruitment Letter/Email

Dear Student,

My name is Cassandra Trevisani and I am a 4th year honors student in Psychology at King's University College. I am emailing to invite you to continue your participation in a research study you completed last year by another honors student named Kendra Di Bacco. My study is titled "Longitudinal Relationships of Self-Regulation, Stress, and Mindfulness in Undergraduate Students" and we are hoping to compare the data that was collected last year by Ms. Di Bacco with data from this year.

In order to participate in the study, you must be enrolled at King's University College. Participation in this study involves completing an electronic survey. The questions will ask you to report the extent to which you agree with each statement. One series of questions will ask you about your engagement in self-regulation. The second series of questions will ask you about your perceived level of mindfulness. The third series of questions will ask you about the stress you have experienced at university in the past month. The fourth series of questions will ask you about your motivation for learning in university.

Participation in the study is expected to take less than one hour. Students who are enrolled in Psychology 1000 have the opportunity to receive up to 2.5% bonus credit towards their final grade for participating in the study and completing a related assignment. Students who participated in the study last year (2013-2014 academic year) will have the opportunity to enter into a draw for one of five $50 gift certificates.

Participants are free to withdraw at any time and those who are in Psychology 1000 will still receive credit for the written assignment.

If you wish to participate in this study, please follow this URL:

XXXXX

Thank you,
Cassandra Trevisani"

Appendix H
Consent Form

Research Project: Longitudinal Relationships of Self-Regulation, Stress, and Mindfulness in Undergraduate Students

Welcome to the Longitudinal Relationships between Self-Regulation, Stress and Mindfulness Study

Thank you for taking the time to participate in this voluntary study. Your insight is greatly valued and will be useful in the ensuing research. We are interested in learning how mindfulness, self-regulation, and motivation relate to and influence stress. Participation in the study will require approximately 30 minutes of your time and will involve responding to a series of questions as they apply to your experiences. No known risks are associated with participation. All information you provide will be confidential and used for research purposes only. You are free to withdraw from this study at any time however, exiting or closing the questionnaire before pressing "submit" will result in lost data.

At the end of the survey, you will have the opportunity to enter your email address to request a summary of the results of this study. If you have any questions or concerns about this research, please contact Dr. Lynda Hutchinson at lhutch4@uwo.ca. Thank you once again, Cassandra Trevisani.

Please answer all questions referring to your particular experiences

I have read the above and agree to participate in the research

Yes
No

I am aware that participation in this study may result in the researchers contacting me in the future for follow-up research
(Please type name to acknowledge the above statement)

Please enter your UWO email address so we may contact you about the possibility of participating in future research

I give consent to participate in this study

Yes
No

Appendix I
Debriefing Form

Research Project: Longitudinal Relationships of Self-Regulation, Stress, and Mindfulness in Undergraduate Students

Thank you for the completion of the Longitudinal Relationships between Self-Regulation, Stress and Mindfulness. The purpose of the current study is to examine how undergraduate students studies is related to their mindfulness, self-regulation stress, and motivation during this time. This study assessed students' levels of self-regulated learning, mindfulness, stress and motivation for learning using a variety of self-report measures. The objective of this study is to examine how students' self-regulation, mindfulness, stress, and motivation grows and changes during the undergraduate years.

It is expected that students who report higher levels of mindfulness and self-regulation will report lower levels of stress, and higher levels of motivation compared to students who display low levels of mindfulness and self-regulation. It is also hypothesized that students who reported high levels of mindfulness and self-regulation in their first year of studies will continue to report high levels of mindfulness and self-regulation one year later.

If you are interested in learning more about this topic, you may be interested in referring to the following articles:

Palmer, A., & Rodger, S. (2009). Mindfulness, stress, and coping among university students. Canadian Journal of Counselling, 43(3), 198-212. Retrieved from http://search.proquest.com/docview/195804643?accountid=15115

Zimmerman B., J. (2002). Becoming a self-regulated learner: An overview. Theory Into Practice, 41(2), 64-70. Retrieved from http://www.tandfonline.com/doi/abs/10.1207/s15430421tip4102_2#.VEB8_7627zI

Thank you for participating! Please do not discuss this debriefing with any other potential participants.

If you have any questions, comments or concerns about any aspect of the study, you may refer to Dr. Lynda Hutchinson, the advisor on this thesis.

Professor Lynda Hutchinson
Phone: 519-433-3491
Office: FB 309
Email: lhutch4@uwo.ca

Cassandra Trevisani: 4th year Honors Student, Thesis Project