

Towards Lifelong Learning: Identifying Learner Profiles on Procrastination and Self-regulation

Betsy Ng

Nanyang Technological University

Abstract

Considerable evidence indicates the importance of motivation and self-regulated learning in educational settings. However, there is an insufficient understanding about the influences of social elements and educational factors on students' motivation and self-regulated learning, as well as how motivation for academic learning contributes to lifelong learning. Using a person-centered approach, this study examines the diverse motivational-cognitive profiles of secondary school students in relation to perceived teacher autonomy support, psychological needs and motivational regulations towards academic subjects. Groups were described in terms of student procrastination and motivated strategies for learning. Results revealed four distinct profiles of student procrastination and self-regulation: active procrastinator; active self-regulator; passive self-regulator; and passive procrastinator. These learner profiles also differed significantly in terms of psychological variables that are important for self-determined behaviors and successful learning. Cluster-analytic findings suggest that a lifelong learner is likely to adopt the profile of an active self-regulator. Implications to teaching and learning are also discussed.

Introduction

To develop a mindset for lifelong learning, Singapore's Ministry of Education (MOE) has devised a New Framework for the 21st century—students should possess lifelong learning goals and life-ready competencies such as creativity and innovation. It is our collective vision that every student will become a confident person, a self-directed learner, an active contributor and a concerned citizen (MOE, 2010). From an educational initiative to a pedagogical paradigm, it is increasingly important to foster a culture of lifelong learning and help students embrace a mindset for lifelong learning. Lifelong learning is defined as “the competence for learning throughout one's lifetime, a domain-specific competence that requires motivation and self-regulated learning” (Lüftenegger et al., 2015, p. 2). Lifelong learning is also “a natural propensity of human beings to continue to learn” (McCombs, 1991, p. 120). As such, a lifelong learner is motivated and self-regulated. By taking ownership of learning, students experience a sense of autonomy and the joy of mastery that is inherent to lifelong learning.

Lifelong learning is primarily a topic for personal development, further education, and successful learning. It should be nurtured from an early learning experience into adulthood. Schools have been encouraged to lay cornerstones for preparing students for lifelong learning. Learners should develop the enduring core of competencies, values, and character from young so that they have the resilience to succeed and build a strong foundation for lifelong learning (Ng, 2007; 2013). Nevertheless, it has been challenging for teachers to elicit students' interest and motivation in academic learning. Furthermore, there are limited empirical studies on lifelong learning and motivation, as well as how motivation contributes to lifelong learning.

Empirical studies had shown declining motivation towards learning during their junior high or middle school years (e.g., Woods-McConney, Oliver, McConney, Maor, & Schibeci, 2013).

Students tend to control their effort level towards tasks or school assignments. Procrastination refers to putting off or postponing one's task until another day. Procrastination is considered as a motivational strategy of self-handicapping or a deliberate self-motivating strategy whereby students withdraw their effort upon given difficult tasks or procrastination in performing school tasks (Choi & Moran, 2009). Previous research of procrastination has focused on college students (e.g., Chu & Choi, 2005; Rebetz, Rochat, & Van der Linden, 2015). To date, such studies are still limited in the academic contexts of middle and junior high schools.

The present study aimed to uncover an in-depth and meaningful understanding of different learners' behaviors, ranging from adaptive to maladaptive patterns of motivational-cognitive learning, psychological factors and academic achievement. It drew on different clusters to show how these patterns of outcomes might link to student learning, thus providing practical insights to teachers. By profiling diverse learners, this study potentially identified the self-regulation and self-determined behaviors of a lifelong learner. To sum, this paper posited a person-centered perspective of diverse learners' profiles and how to foster intrinsic motivation in their academic learning.

Theoretical Framework

Grounded in the self-determination theory (SDT), individuals usually have natural organismic activities and integrative propensities that coordinate them towards satisfaction of needs (Deci & Ryan, 1985). Different individuals will engage in diverse behaviors so as to satisfy their needs. SDT research focuses on three basic psychological needs (i.e., autonomy, competence and relatedness) to predict behavior and various outcomes of individuals. In addition, previous research showed that social-contextual relations have a significant impact on students' motivation, self-regulated learning and achievement in middle and high schools (e.g., Kim, Park, & Cozart, 2012; Yoon, 2009). Hence, it is plausible that learning climates and social relations in classrooms are critical in fostering intrinsic motivation and promoting self-determined behaviors in learning.

In schools, students are likely experiencing extrinsic motivation and they do an academic task for external reasons. Within SDT, there are four types of extrinsic motivation, namely they are external, introjected, identified and integrated regulation (Ryan & Deci, 2000). External regulation refers to a person's behavior due to external locus of initiation; introjected regulation involves one to internalize rules and behaviors due to internal pressure; identified regulation involves one to identify the process with a sense of choice; and integrated regulation is congruent with the characteristics of intrinsic motivation.

From the SDT perspective, teachers' autonomy-supportive instructional behaviors promote students' motivation and learning (Reeve, 2009). Previous research within the SDT context supported the benefits of autonomy-supportive structure such as intrinsic enjoyment (Mouratidis, Vansteenkiste, Lens, & Sideridis, 2008), self-regulated learning (Sierens et al., 2009) and academic achievement (Jiang, Yau, Bonner, & Chiang, 2011). According to von Eye & Bogat (2006), distinct subgroups of perceived autonomy support can best be exhibited by cluster analysis.

Given that the study focused on understanding learner profiles, motivational beliefs and self-regulatory strategies were used. Research revealed motivational beliefs and self-regulatory strategies were associated with academic performance (Kornell & Metcalfe, 2006; Zimmerman & Schunk, 2008). According to Pintrich and colleagues (1993), the Motivated Strategies for Learning Questionnaire (MSLQ) was designed to assess motivation and self-regulated learning in a domain- or context-specific form of measurement. Although the ability of students to self-regulate is important, students tend to delay academic tasks until the last minute (Wäschle et al., 2014), which

can be considered as self-handicapping or failure-avoidance strategy. Previous studies showed that procrastination is considered as an important component of self-regulated learning and is associated to academic learning (e.g., Howell & Watson, 2007).

In a recent study, procrastination was associated with low levels of self-regulation and identified motivation (Rebetz et al., 2015). In addition, it has been contradictory that procrastination was associated with grades. For instance, college students who intentionally procrastinated (known as active procrastinator) did not have any significant effect on grades (Schraw et al., 2007), whereas active procrastination significantly predicted course grades (Corkin et al., 2011). Besides the inconsistency of findings, there is also limited research on procrastination of students from junior high schools. In this study, the term academic procrastination was operationalized as postponing of academic tasks and was included in the MSLQ inventory for junior high students (Pintrich & De Groot, 1990). This revised MSLQ inventory was renamed as MSLQ-R. Based on this theoretical framework, the present study identified groups of learners in terms of student procrastination and motivated strategies for learning.

Purpose of the Study

Besides the utility of the MSLQ-R to evaluate students' learning and achievement, the context of learning also influences students' motivation, self-regulated learning and achievement in junior high or middle schools (Kim et al., 2012). It is thereby of importance to investigate the learning climate and social relations in classrooms. To assess these social-contextual factors, SDT variables such as perceived teacher autonomy support and need for relatedness were included. To date, this is the first profiling study to examine student procrastination and motivated strategies for learning in the academic contexts of junior high schools.

The research questions were: (1) would there be distinct students' motivational-cognitive profiles on task value, self-efficacy, strategy use, test anxiety, and procrastination and (2) would there be distinct learner profiles in association with self-determined behaviors and academic achievement? The specific hypotheses therefore were: (1) there would be distinct motivational-cognitive profiles with more adaptive clusters exhibiting higher motivational beliefs and cognition, but lower test anxiety and procrastination and (2) the most adaptive profiles would exhibit highest scores on perceived teacher autonomy support, needs satisfaction, autonomous motivation, and academic achievement. To sum, the key goal in this study was to identify the most and least adaptive learner profiles. The diverse learner profiles were then compared in association with perceived teacher autonomy support, individual psychological need satisfaction, types of motivational regulation (extrinsic, introjected, identified, and intrinsic regulations), and academic achievement.

Method

Participants and Procedure

Data were collected from 442 students (215 females and 227 males) in seven public Singapore secondary schools, with an average age of 14.7 ($SD = .67$). Ethic clearance from the university review board and MOE were obtained. Participants were briefed on the purpose of the study and the confidentiality of their responses was assured. Their participation was voluntary.

Measures

For all measures, students rated all items on a 7-point Likert scale, from 1 (*not at all true of me*) to 7 (*very true of me*).

MSLQ Plus Procrastination Scale

Twenty-two items from the MSLQ Junior High (Ng et al., 2015) were used to measure junior high student motivational beliefs and their learning strategies in science in this study. The MSLQ constructs were motivational beliefs (task value and self-efficacy scales; 5 items each), affect (test anxiety scale; 4 items), and cognitive strategies (learning strategies scale; 8 items). An example of task value specific to science was “I prefer Science work that is challenging so I can learn new things.” An item for self-efficacy included “... I think I know a great deal about Science.” For test anxiety, an item included “I am so nervous during a Science test that I cannot remember facts I have learned.” For learning strategies, an item included “When I study for a Science test, I practise saying the important facts over and over to myself.”

Together with the four scales of MSLQ, the academic procrastination scale (Lay & Silverman, 1996) was included and an example of the item was “I usually do my homework at the last minute.” The confirmatory factor analysis (CFA) was performed to establish the validity and reliability in local educational contexts. Findings of CFA reflected a satisfactory model fit ($\chi^2 = 578.69$, $df = 308$, $p < .001$, $\chi^2/df = 1.88$, $TLI = .94$, $CFI = .95$, $RMSEA = .045$, 90% confidence interval (CI) for $RMSEA = .039-.050$) and confirmed the five-factor structure of the revised MSLQ (MSLQ-R). The internal consistency for the five scales, namely task value ($\alpha = .79$), self-efficacy ($\alpha = .87$), test anxiety ($\alpha = .74$), learning strategies ($\alpha = .85$), and procrastination ($\alpha = .79$) were also satisfactory.

Learning Climate Questionnaire (LCQ)

The 15-item instrument was used to measure perceived teacher autonomy support (Williams & Deci, 1996). An example of the items was “I feel that my teacher provides me choices and options.” It has good internal reliability with Cronbach’s alpha = .95.

Basic Psychological Needs Scale (BPNS)

Twelve items of this instrument were used to measure student autonomy, competence, and relatedness (Deci & Ryan, 2000). An example of the items for autonomy was “I am free to express my ideas and opinions...” (4 items); competence was “In school, I feel pretty competent” (3 items); and relatedness was “I feel close to my school mates” (5 items). The internal consistency of each scale was satisfactory: $\alpha = .70$ for autonomy, $\alpha = .74$ for competence, and $\alpha = .85$ for relatedness.

Academic Self-Regulation Questionnaire (SRQ-A)

The 12-item instrument was used to measure four types of motivational orientations in the context of academic subjects (Ryan & Connell, 1989). Statements representing an autonomous motivational style (identified regulation and intrinsic motivation) and a controlling motivational style (external regulation and introjection) were modified in the specific academic context (i.e., science). The stem for the SRQ-A was “My reasons for doing my work in Science. ...” A sample item that measured each type of regulation in science was included. For autonomous motivation, an item for identified regulation was “because I want to improve in Science,” and for intrinsic motivation was “because Science is fun.” For controlling motivational style, an item for external regulation was “because I’ll get into trouble if I don’t,” and introjection was “because I’ll feel bad about myself if I don’t.” The internal consistency of each scale was satisfactory: $\alpha = .72$ for extrinsic regulation; $\alpha = .72$ for introjected regulation; $\alpha = .77$ for identified regulation; and $\alpha = .81$ for intrinsic regulation.

Grades

At the end of the survey administration, student grades for science were collected. To ensure anonymity, students indicated their school term test grades (out of 100 marks). Their mean test score was 60.83 out of 100 marks ($SD = 14.36$).

Data Analysis

For data analysis, hierarchical cluster analysis using Ward's method, with Euclidean distance as a measure of similarity (Hayenga & Corpus, 2010) was conducted. Hierarchical cluster analysis was chosen to identify the distinct groups of learners within the sample using the MSLQ-R variables. The five clustering variables were task value, self-efficacy, learning strategies, test anxiety, and procrastination. Ward's method was chosen because it searches the proximity matrix and divides the learners into homogenous subgroups (Borgen & Barnett, 1987). As cluster analysis solution can be unstable, a k -means clustering method was used to confirm the clusters (Wang & Biddle, 2001). The k -means cluster profiles were in agreement with those obtained from hierarchical cluster analysis, thus supporting the four-cluster solution.

To examine the associations between clusters and SDT variables, a one-way MANOVA was executed. All multivariate F values were reported based on Pillai's Trace value. According to Tabachnick and Fidell (2001), the Pillai's Trace is a more important criterion to determine the multivariate effect because as it is more robust to violations of multivariate normality assumption (Tang & Neber, 2008). To further examine the associations between clusters and academic achievement, a one-way ANOVA was executed. All data analyses were performed using IBM SPSS 21.0.

Results

Descriptive Statistics and Correlations

Table 1 presents the description statistics and Pearson's correlations between the measured variables with academic achievement (i.e., grade). All the variables were significantly correlated.

Procrastination was positively correlated with anxiety; extrinsic, identified and intrinsic regulations; and grades but negatively correlated with task value; self-efficacy; perceived teacher autonomy support; and needs satisfaction. Task value was positively correlated with self-efficacy; both variables also have a positive relationship with learning strategies; perceived teacher autonomy support; needs satisfaction, motivational regulations; and academic achievement. However, introjected regulation was not related to procrastination, self-efficacy and anxiety. Unexpectedly, anxiety was not associated with learning strategies but negatively related to autonomy support; needs satisfaction; intrinsic regulation; and grade. Learning strategies was positively related to autonomy support, needs satisfaction and motivational regulations (except extrinsic regulation).

Table 1. Means, Standard Deviation and Pearson Correlations of the Key Variables ($N = 442$)

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12	13
Procrastination	3.69	1.25													
Task value	4.98	.99	-.39**												
Self-efficacy	4.25	1.00	-.34**	.67**											
Anxiety	4.06	1.25	.49**	-.23**	-.29**										
Learning strategies	4.78	1.07	-.28**	.56**	.50**	-.05									
Perceived autonomy support	4.67	1.12	-.35**	.57**	.43**	-.19**	.36**								
Autonomy	4.50	.90	-.31**	.50**	.40**	-.12*	.42**	.61**							
Competence	4.57	1.12	-.38**	.63**	.57**	-.25**	.45**	.59**	.63**						
Relatedness	5.07	1.08	-.25**	.42**	.32**	-.11*	.37**	.44**	.61**	.55**					
Extrinsic regulation	4.65	1.33	.35**	-.13**	.28**	.28**	.02	.06	-.01	-.12*	.05				
Introjected regulation	4.22	1.27	-.05	.27**	.08	.06	.32**	.25**	.29**	.24**	.24**	.44**			
Identified regulation	5.54	1.07	.31**	.63**	.34**	-.05	.56**	.46**	.41**	.55**	.43**	.06	.42**		
Intrinsic regulation	4.46	1.42	.44**	.53**	.44**	-.15**	.39**	.44**	.42**	.55**	.40**	-.21**	.22**	.54**	
Grade	60.83	14.36	.32**	.36**	.42**	-.24**	.23**	.32**	.27**	.38**	.28**	-.03	.12**	.28**	.21**

Note: * $p < .05$; ** $p < .01$

Profiling of MSLQ-R Variables

Based on the agglomeration schedule and dendrogram, four distinct clusters in terms of MSLQ-R variables were uncovered. Figure 1 illustrates the cluster profiling of MSLQ-R variables. Z scores above .5 were set as a criterion to describe clusters that scored relatively “high,” whereas z scores below -.5 were denoted as groups scoring relatively “low.”

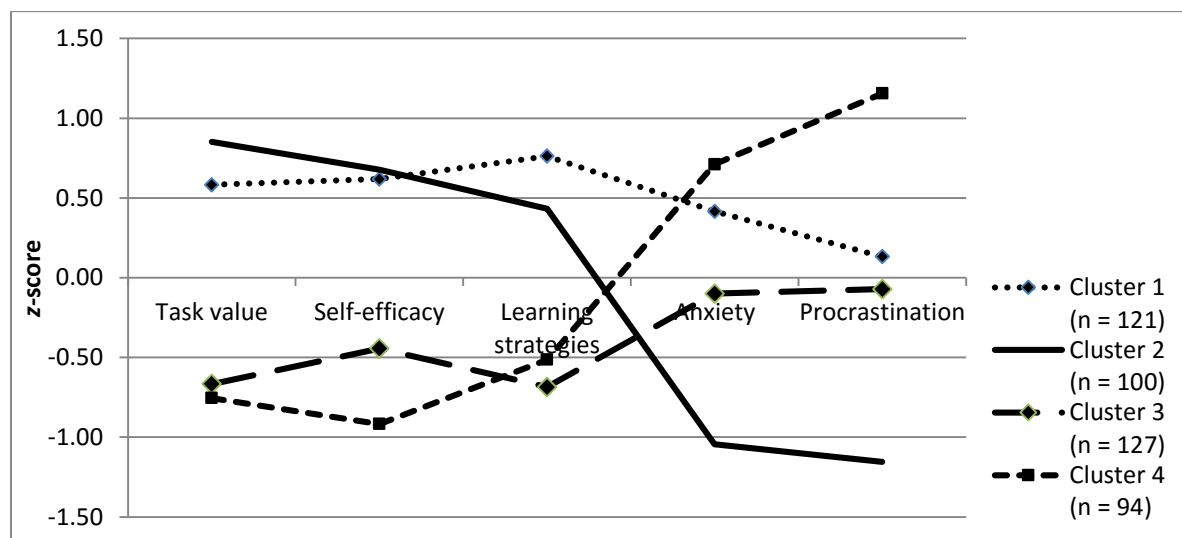


Figure 1. Cluster Profiling of MSLQ-R Variables

Students in the first cluster (27.4%) were self-efficacious and self-regulated, yet demonstrating high anxiety and moderate high procrastination. This cluster was labelled as active procrastinator.

Cluster 2 (22.6%) was deemed as the best profile. Students in this cluster were high in motivational beliefs and learning strategy use, but low in anxiety and procrastination. This cluster was labelled as active self-regulator. Cluster 3 (28.7%) had a reverse pattern of Cluster 1. Students in the third cluster were low in motivational beliefs and self-regulation with moderate low levels of anxiety and procrastination. The third cluster was labelled as passive self-regulator. Finally, students in the fourth cluster (21.3%) exhibited low motivational beliefs and strategy use, but high in anxiety and procrastination. This group of learners was labelled as passive procrastinator and deemed as the least adaptive. Table 2 summarizes the profiles of these four clusters.

Table 2. Summary of Cluster Profiles on MSLQ-R Variables

Cluster	1	2	3	4
Description	High motivational beliefs High learning strategy use High anxiety Moderate high procrastination	High motivational beliefs High learning strategy use Low anxiety Low procrastination	Low motivational beliefs Low learning strategy use Moderate low anxiety Moderate low procrastination	Low motivational beliefs Low learning strategy use High anxiety High procrastination
Label	Active procrastinator	Active self-regulator	Passive self-regulator	Passive procrastinator

Differences Between Clusters and SDT Variables

Four clusters differed significantly in these variables, Pillai's Trace = .59, $F(24, 441) = 13.20$, $p < .001$, $\eta_p^2 = .20$. Table 3 presents the descriptive statistics for each cluster while Figure 2 illustrates the comparison of the four-cluster profiles in association with perceived teacher autonomy support, needs satisfaction and motivational regulations.

Table 3. Comparison of the Four-cluster Profiles on SDT Variables and Academic Achievement

Variable	Cluster 1 (<i>n</i> = 121)		Cluster 2 (<i>n</i> = 100)	
	<i>M</i> (<i>z</i>)	<i>SD</i>	<i>M</i> (<i>z</i>)	<i>SD</i>
Perceived autonomy support	5.06 (.24) _a	1.07	5.55 (.68) _c	1.01
Autonomy	4.50 (.20) _a	.73	4.88 (.67) _c	.87
Competence	4.79 (.29) _c	.76	5.31 (.80) _d	.95
Relatedness	5.33 (.23) _a	.97	5.63 (.50) _a	.93
Extrinsic regulation	4.95 (.23) _c	1.31	3.98 (-.49) _b	1.58
Introjected regulation	4.80 (.46) _a	1.20	4.23 (.00) _b	1.38
Identified regulation	6.09 (.51) _a	.73	6.11 (.51) _a	.84
Intrinsic regulation	4.82 (.25) _a	1.28	5.34 (.62) _c	1.25
Grade	64.07 (.23) _a	13.92	67.76 (0.48) _a	11.53

Variable	Cluster 3 (<i>n</i> = 127)		Cluster 4 (<i>n</i> = 94)		<i>F</i>	η_p^2
	<i>M</i> (<i>z</i>)	<i>SD</i>	<i>M</i> (<i>z</i>)	<i>SD</i>		
Perceived autonomy support	4.29 (-.39) _b	.92	4.17 (-.51) _b	1.18	41.29*	.22
Autonomy	4.09 (-.30) _b	.58	3.89 (-.56) _b	.72	37.67*	.21
Competence	4.10 (-.39) _a	.71	3.78 (-.70) _b	1.00	67.46*	.32
Relatedness	4.64 (-.46) _b	.83	4.90 (-.20) _b	1.10	24.01*	.14
Extrinsic regulation	4.50 (-.13) _a	1.02	5.18 (.41) _c	1.13	18.00*	.11
Introjected regulation	3.91 (-.24) _b	.99	3.87 (-.27) _b	1.31	14.44*	.09
Identified regulation	4.96 (-.54) _b	.96	5.04 (-.47) _b	1.14	53.26*	.26
Intrinsic regulation	3.99 (-.33) _b	1.17	3.70 (-.54) _b	1.42	35.89*	.20
Grade	56.50 (-.30) _b	13.20	55.12 (-.40) _b	15.06	21.18*	.13

Note. * $p < .001$. Means in the same row with different subscripts differ significantly at $p < .05$ in the Tukey's HSD comparison.

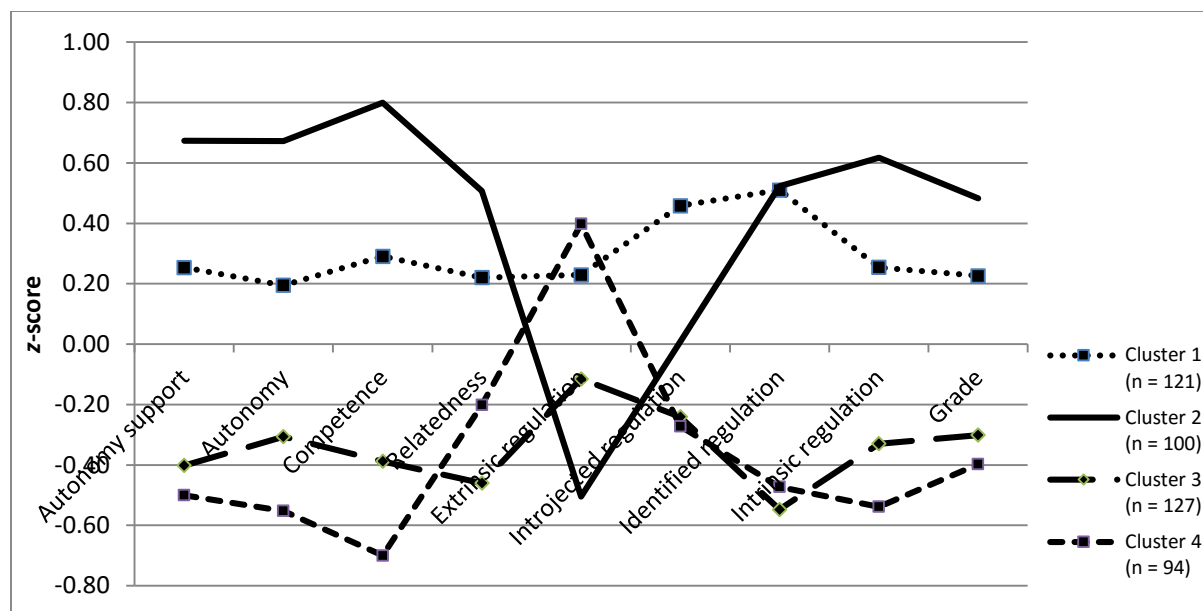


Figure 2. Cluster profiles in association with SDT variables and academic achievement

Cluster 1 with high MSLQ-R profile showed high levels of perceived teacher autonomy support, needs satisfaction and motivational regulations. Cluster 2 with the most adaptive MSLQ-R profile demonstrated very high levels of perceived teacher autonomy support, needs satisfaction and self-determined motivations (i.e., identified and intrinsic). In addition, students in Cluster 2 exhibited the lowest level of extrinsic regulation, highest level of intrinsic regulation and highest academic grade. Cluster 3 with low MSLQ-R profile exhibited low levels of perceived autonomy support, needs satisfaction and motivational regulations. Being the least adaptive MSLQ-R profile, Cluster 4 exhibited very low levels of perceived autonomy support, needs satisfaction and intrinsic regulation, but high in extrinsic regulation.

Based on the effect sizes, significant differences existed for all SDT variables among all clusters. Among needs satisfaction, perceived competence had the greatest effect on all clusters. Although the four clusters differed in four types of motivational regulation, the differences in identified regulation and intrinsic motivation were more pronounced. Subsequently, pairwise comparisons with Tukey's Honestly Significant Difference (HSD) were conducted to uncover an in-depth description of the four clusters.

Differences Between Clusters and Academic Achievement

Examining academic achievement, results revealed that all clusters differed significantly ($F(3, 441) = 21.18, p < .001, \eta_p^2 = .13$). All pairwise comparisons were significant ($p < .05$). Tukey HSD revealed significance differences between Clusters 1–2 and Clusters 3–4.

Discussion

The present findings support both hypotheses of the study. First, cluster analysis revealed four distinct motivational-cognitive profiles of learners, with more adaptive clusters exhibiting higher motivational beliefs and cognition, but lower test anxiety and procrastination. Second, the most adaptive cluster with high endorsement of self-determined behaviors was identified, that is, active self-regulator. Active self-regulator had high scores on perceived teacher autonomy support, needs

satisfaction, identified and intrinsic regulations, as well as grade. Similarly, active procrastinator endorsed high levels of perceived autonomy support, needs satisfaction and motivational regulations. Students in this group also scored moderately well academically. Hence, students endorsing self-determined behaviors are likely to perform academically well. Active self-regulator is deemed as the most adaptive profile. Passive self-regulator had low scores for all SDT variables and grade, suggesting less self-determined behaviors is linked to decreased self-regulation. Finally, passive procrastinator exhibited low levels in motivational beliefs and learning strategy use, but high in anxiety and procrastination. This cluster scored the lowest grade among others, indicating the least adaptive profile.

Based on the current findings, procrastination may not have a negative impact on students' learning and academic performance. Profile of Cluster 1 fits the description of an active procrastinator who feels challenged and motivated to work under pressure (Chu & Choi, 2005). As such, active procrastinator is capable to act on tasks at hand in a timely manner by deliberate suspension of actions. An active procrastinator also has persistence in completing tasks at the last minute. Likewise, correlational results indicated that procrastination was positively associated with motivational regulations and grade. In contrast, passive procrastinator (i.e., Cluster 4) does not delay actions deliberately but postpones tasks due to lack of ability to make decisions quickly, endorsing high levels of procrastination. As a result, passive procrastinator is more likely "to give up and fail to complete tasks," inducing a sense of anxiety (Chu & Choi, 2005, p. 247). This explanation is in line with current findings: Passive procrastinator group scored the highest in anxiety and lowest in grade when compared to other clusters. In addition, passive procrastinator exhibited the highest level of extrinsic regulation when compared to other clusters. The presence of controlled motivation is linked to pressure and stress whereby students are likely to procrastinate more and feel more anxious (Vansteenkiste et al., 2009). To sum, the cluster profiles of active and passive procrastinators differed on cognitive, affective, and behavioral dimensions: reversed patterns of motivational beliefs, anxiety and self-regulated learning. Active self-regulator (i.e., Cluster 2) displayed a more adaptive academic pattern of functioning than the passive self-regulator (i.e., Cluster 3). Students in the active self-regulator group were likely more self-efficacious; less anxious; more self-regulated; less procrastinating; more autonomously motivated (i.e., identified and intrinsic regulations); and obtained higher grades than those in the passive self-regulator cluster. Passive self-regulator seemed more vulnerable to poor self-regulation due to low scores on learning strategies and task value. Furthermore, students in this group demonstrated low levels of autonomous motivation which may undermine learning strategies and academic achievement. Autonomous motivation is considered as good quality as it yields better cognitive processing and self-determined behaviors (Vansteenkiste et al., 2009). The abovementioned findings suggest that a lifelong learner is likely to adopt the profile of an active self-regulator and endorse self-determined behaviors.

On the contrary, the presence of controlled motivation for active procrastinator did not detract from strategy use and students in this group scored second highest on grade. This is in line with the characteristics of active procrastinators such that they are capable of successful accomplishment of tests at the last minute (Hannok, 2011). It is also interesting to note that the active procrastinator seemed to endorse a greater element of choice than passive procrastinator, as indicated by the higher scores of autonomy than that of passive procrastinator. This finding is consistent with high level of identified regulation in which the individual feels a sense of choice (Ryan & Deci, 2000). Hence, active procrastination could be viewed as "educationally productive postponement" and it involves effective effort at the last minute (Hensley, 2014).

Current findings have proven Senécal and colleagues' (1995) suggestion that low levels of procrastination could be assured with intrinsic motivation. This is an important contribution to existing research as the most adaptive cluster, active self-regulator endorsed low level of procrastination and exhibited high intrinsic motivation. It is likely that students will procrastinate in academic context if they are not interested in the tasks. However, procrastination seems to be a motivational problem unless a very high threshold of needs satisfaction and intrinsic motivation can be reached. Hence, procrastination may continue to be a salient issue in the academic domain, which explains why all four clusters endorsed varied levels of procrastination.

The present findings of cluster analysis support the evidence that students with the most adaptive learning profile are likely to exhibit self-determined behaviors, with identified motivation more pronounced. By examining the motivational-cognitive elements and self-regulation from a person-centered perspective, results indicated that the inclusion of the psychological variables add value to different learner profiles. These trajectories of learner profiles provide empirical support for the concept of lifelong learning in identifying self-regulation and self-determined behaviors. Furthermore, it recognized the central role of need for competence across academically-driven learners in Singapore educational context, as denoted by highly perceived competence in Clusters 1 and 2. Since Singapore is reputed as being an achievement-driven society, secondary school students are required to take high-stakes examinations (Ng, 2013; Tan, 2013). The differed viewpoint of need satisfaction from the secondary school students in Singapore contributes to the existing SDT-based educational research.

Implications and Limitations

The MSLQ-R cluster profiles were examined in association with perceived teacher autonomy support, types of motivational regulation and individual need satisfaction. Findings suggest that students with greatest perceived teacher autonomy support demonstrated greatest needs satisfaction and self-determined behaviors, contributing to academic success. This indicates that student motivation and use of cognitive strategies may be influenced by the instructional behaviors of teachers, that is, autonomy-supportive teaching style. Teachers may consider adopting teaching strategies such as autonomy support to promote positive learning outcomes and academic performance in Singapore schools. Likewise, the profile of an active self-regulator may provide novel insights into the self-determined behavior of a lifelong learner. Furthermore, the distinct clusters with individual psychological need and motivational regulation may inform teachers of the learner preferences and self-determined behaviors.

The present study contributes to the fields of motivation and education in several ways. First, this study extended the existing motivation research by identifying motivational beliefs and learning strategies of both active and passive procrastinators. However, it is unclear if procrastination should be viewed as a "motivator" to learning for those students in the active procrastinator cluster, despite scoring second best after the active self-regulator. Additional research is needed to identify the characteristics of motivation in active procrastinators. Second, this is the first empirical study that refined and validated the revised MSLQ with inclusion of academic procrastination construct and renaming it as MSLQ-R. Besides refining the conceptual framework of Pintrich's model (1990), the present findings also contribute to the existing SDT-based literature as well as underscore the synthesis of self-regulated learning and SDT.

This person-centred analysis offered an in-depth view of each psychological need and motivational regulation. Nevertheless, there are still some limitations to be acknowledged. First, the causal-effect could not be determined as this is a cross-sectional study. Future study could

consider examining the effects of teacher autonomy support either across two time points or via a classroom intervention. Second, the present findings did not examine the relationship between motivation and lifelong learning. Future research could include additional constructs and analyses to investigate how motivation contributes to lifelong learning for the diverse learner profiles. Finally, this study did not have a second sample to confirm the MSLQ-R. Further data collection and analyses could improve the present study.

In conclusion, learners should identify their learning needs by studying and applying the new knowledge to the problem, as well as develop a pleasure in acquiring knowledge so as to become lifelong learners. In essence, the love of learning has to be promulgated (Ben-Jacob, Levin, & Ben-Jacob, 2000). If students do not perceive the intrinsic value in doing the task, positive strategies need to apply to academically help them. Students have to understand the rationale and incorporate self-motivation into their learning. Autonomy support from the teacher has to be provided to facilitate the students' academic learning and develop their lifelong learning skills. As such, students will be intrinsically motivated and self-directed in their learning throughout the span of their lives.

Acknowledgements

I like to express my gratitude to all teachers and students involved in this study. Last but not least, I thank the reviewers for this paper.

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