

Cognitive and Social Antecedents of Academic Success

Damian J. RIVERS

Abstract: Informed by a social cognitive approach to self-regulation and learning (Zimmerman, 2002), the current study assesses the predictive capacity of personality, academic self-efficacy, goal orientation and approaches to learning to account for the academic achievements of a cohort of 256 Japanese university students. Through correlation and sequential regression analyses the data indicate that goal orientation (achievement motivation) is the primary contributor to academic achievement, and one which has a greater impact among low-achiever students. Moreover, the type of goal orientation utilized in service of academic achievement can be differentiated between low-achiever and high-achiever students. Among low-achievers a task goal-orientation made a significant positive contribution to academic achievement outcomes while among high-achievers an ability-approach orientation was dominant in terms of its positive impact. The personality trait of conscientiousness was the most important in predicting academic achievement among low-achiever students where no other trait was found to be significant.

Keywords: academic achievement, approaches to learning, goal orientation, personality, self-efficacy

1 Background and Aim

Interest in the antecedents of academic achievement has been a longstanding feature of interdisciplinary research arising primarily from the field of educational psychology, and more recently, cognitive science. Prior studies have utilized a broad spectrum of variables and conceptual approaches in an effort to identify the predictors of desirable academic outcomes. These studies have focused on learning styles (Busato et al., 1999; Kolb, 1984; Schmenk, 1983; Vermunt, 1996), personality traits (De Radd & Schouwenburg, 1996; Kappe & Van der Flier, 2012; Lounsbury et al., 2003), academic emotions (Pekrun & Linnenbrink-Garcia, 2012), subject-specific anxiety (Dowker et al., 2016), social support (Juvonen et al., 2012; Song et al., 2015), self-efficacy and task-mastery beliefs (Bandura, 1977, 1986, 1997; Zimmerman, 2000), academic self-concept (Guay et al., 2010; Khalaila, 2015), self-regulation (Mega, Ronconi & de Beni, 2014; Zhou, 2015), locus of control, outcome attribution and expectancy (Vroom, 1964) and motivation and goal orientation (Ames, 1992; Pintrich & Schunk, 1996; Weiner, 1985).

Such research indicates that academic achievement is strongly influenced by individual differences (Komarraju et al., 2009; Rothstein et al., 1994). Moreover, such research also emphasizes that for many stakeholders, having the predictive capacity

to explain the academic successes and failures of students is of the utmost importance, especially within the context of higher education (Ruban & McCoach, 2005). Indeed, having knowledge of the factors responsible for variations in academic achievement allows educators to create more equitable curricula which consider individual student strengths and weaknesses. Informed by a social cognitive approach to self-regulation and learning (Zimmerman, 2002), the current study assesses the predictive validity of a selection of personality, motivation and study related variables to the academic achievement outcomes of a population of Japanese university students.

2 Literature

Personality

The role of personality in academic achievement has a long history (cf. Cattell, 1973; Harris, 1940; Webb, 1915). Recent research suggests that personality, especially individual traits such as grit, perseverance and conscientiousness, accounts for more variance in academic achievement than intelligence (cf. Bratko et al., 2006; Hakimi et al., 2011; Noffle & Robins, 2007; Rimfield et al., 2016). In distinguishing intelligence and personality within an educational context, O'Connor and Paunonen (2007) state that intelligence is a reflection of what an individual can do on the basis of cognitive ability, whereas personality is reflective of what an individual

is inclined to do (Furnham & Chamorro-Premuzic, 2004), and therefore, is a facet of individual difference implicated into self-regulatory learning processes. While empirical evidence is inconclusive concerning the impact of each personality trait on academic success, often owing to factors such as developmental age and context, across numerous studies conscientiousness, in accordance with the dominant five-factor model of personality (Digman, 1990; John & Srivastava, 1999; McCrae & Costa, 1997), appears to be the most consistent predictor (Chamorro-Premuzic & Furnham, 2003; Diseth, 2003; Farsides & Woodfield, 2003; Wolfe & Johnson, 1995).

The centrality of conscientiousness is reflected in its description as the most crucial non-cognitive predictor of academic success (Dumfart & Neubauer, 2016). Through a meta-analysis of previous research, Poropat (2009) establish conscientiousness as the most consistent personality trait predictor of academic achievement (see also Vedel, 2016). In a Dutch study, Kappe and Van der Flier (2012) report that conscientiousness is the strongest predictor of academic achievement having an influence five times greater than intelligence, a finding previously explained as due to positive correlations between conscientiousness and self-regulated learning behaviours (cf. Bidjerano & Dai, 2007). Beyond conscientiousness, the research literature shows mixed findings for the other five-factor model personality traits.

Extraversion has been shown to have a negative correlation with academic success within the context of higher education (Bauer & Liang, 2003; Furnham et al., 2003; Goff & Ackerman, 1992). Such findings are rationalized through suggestions that more extraverted students spend more time socializing rather than studying, although the exact type of study task or activity, and the specific subject being assessed, make such attributions problematic. For example, and contrary to the above, Rothstein et al. (1994) document positive links between extraversion and classroom participation grades within a cohort of MBA students.

Agreeableness tends not to have a significant role within the later years of formal schooling (De Fruyt & Mervielde, 1996; Laidra et al., 2007). Some studies have found negative correlations

with classroom performance and GPA (Rothstein et al., 1994) while others have reported positive correlations with course grade (Conrad, 2006) and GPA (Farsides & Woodfield, 2003). Similarly, the trait of openness has produced mixed outcomes. Gray and Watson (2002) report that openness functions to predict GPA while Rothstein et al. (1994) link openness to classroom participation. On the other hand, several studies report no significant links between openness and academic achievement (cf. Conrad, 2006; Dollinger & Orf, 1991; Hair & Hampson, 2006).

Emotional stability has been viewed as having positive or non-significant links with academic achievement (cf. Chamorro-Premuzic & Furnham, 2003) on the basis that less emotionally stable students (i.e., more neurotic) are inclined to suffer anxiety (Watson & Clark, 1984), especially in relation to assessment and testing which is understood to impair academic performance (Chamorro-Premuzic & Furnham, 2005) and motivation to study (Watson, 2000). While earlier research indicates that academic performance is higher within emotionally stable students (Entwistle & Entwistle, 1970), O'Connor and Paunonen (2007) contend that emotional stability may not be a strong predictor of individual differences in academic achievement.

Academic Self-Efficacy

As a motivational variable (Bandura, 2001) deriving from expectancy-value models of motivation (Eccles, 1983; Pintrich, 1989), self-efficacy has been defined as a belief in one's own capability to mobilize the motivational and cognitive resources, necessary to satisfy the situational demands of a particular context (Wood & Bandura, 1989). Within an educational context, self-efficacy beliefs concern the perceived capabilities needed to perform at a certain level of academic achievement. Self-efficacy beliefs are dependent upon the cognitive processes of self-reflection, attribution and appraisal and function to regulate decisions pertaining to expended effort, task choice and task dedication, all of which may act to inform academic achievement outcomes.

A crucial aspect of self-efficacy is that outcome expectations alone are insufficient if actual task-specific competency is lacking (Bandura, 1977). Therefore, self-efficacy beliefs must relate to an

individual's actual capabilities (i.e., expectations of mastery or achievement must be realistic). There is also evidence to suggest that task type, specifically in terms of difficulty, is a factor affecting the impact of self-efficacy on achievement outcomes with easier tasks likely to produce stronger relationships (cf. Stajkovic & Luthans, 1998). Furthermore, self-efficacy as a motivational drive will fail to produce optimal outcomes if the individual is unable to make appropriate choices and decisions concerning the pathway to task mastery. Bandura's (1989) triadic reciprocal determinism model addresses this concern and outlines how a combination of behavioural, cognitive, personal and environmental factors need to be considered in order to describe the causal relationship between self-efficacy beliefs and actual achievement.

Self-efficacy beliefs have also been shown to correlate with the use of effective learning strategies (Pajares, 1996; Schunk & Pajares, 2002), and when placed alongside adaptive cognitive strategies and self-regulation techniques, self-efficacy beliefs have been shown to predict academic achievement (Pintrich & De Groot, 1990; Richardson et al., 2012; Schunk, 1991) through an indirect impact upon goals and goal setting (Zimmerman & Bandura, 1994). More recently, through a meta-analysis of past research Robbins et al. (2004) show that academic self-efficacy and achievement motivation were the strongest predictors of GPA and persistence.

Goal Orientation (Achievement Motivation)

Goal orientations concern the motive for engaging in an academic task or course of study and relate directly to the type of cognitive strategy used (Anderman & Anderman, 1999). The goal orientation framework provides an approach for individuals to interpret and react to events in a way that promotes different patterns of cognition, affect, and behaviour (Dweck, 1986; Dweck & Leggett, 1988). Based upon achievement goal theory (Atkinson & Feather, 1964; Elliot & Harackiewicz, 1996), achievement motivation in terms of goal orientation does not conceive of students as possessing or lacking motivation, but instead focuses upon how students think about themselves, their tasks, and their academic performances (Ames & Archer, 1988).

Midgley et al. (1998, p. 113) draw attention to distinctions between different goal orientations and describe "the goal to develop ability (task goal orientation), the goal to demonstrate ability (ability-approach goal orientation), and the goal to avoid the demonstration of lack of ability (ability-avoid goal orientation)". Students who are task goal-orientated desire to increase understanding and ability. For these students, success is defined in relation to the task and progress is measured in self-referential terms. Several studies have found that a task goal-orientation is positively associated with academic self-efficacy (cf. Anderman & Young, 1994; Anderman & Midgley, 1997). Task goal-orientations have also been positively linked to adaptive learning strategies inclusive of deep information processing (Nolen, 1988).

Ability goal-orientations consist of approach and avoidance aspects (Elliot & Harackiewicz, 1996). Ability orientated students seek favorable judgments of their competence, or to avoid unfavorable judgments of their competence. Success is therefore defined in relation to the feedback provided by significant others such as peers and teachers. Those students who orientate toward approach goals are more likely to see difficulties as challenges to be overcome and therefore motivating (Harackiewicz et al., 1998). Avoidance orientated students see success as being inclusive of the avoidance of demonstrations of individual incompetence or lack of knowledge and ability. Midgley et al. (2000) suggest that the avoidance-orientation is associated with other maladaptive learning behaviours such as a surface approach to learning. Furthermore, those students who orientate toward avoidance goals are more likely to see difficulties in terms of threats rather than challenges, and are thus, more inclined to quit rather than persevere (Elliot & Thrash, 2001).

Approaches to Learning

Messick (1994) emphasizes the importance of approaches to learning research in terms of facilitating a more applied perspective on educational input and output. Deriving from the work of Marton and Saljo (1976) who identified deep and surface levels of processing, research concerning approaches to learning is now a mainstay feature of educational

discourse. A deep approach to learning is reflected in behaviours that seek meaning in the subject matter and that attempt to critically relate it to other experiences and ideas. The use of evidence and the linking together of ideas are dominant strategies (Diseth & Martinsen, 2003). Students who adopt a deep approach seek to understand the subject matter and have an intrinsic interest in it in a way that promotes enjoyment and satisfaction from studying. On the other hand, students who adopt a surface approach view that the task of learning as an imposition. These students might view individual parts of the subject as delineated entities and fail to integrate ideas and perspectives into a coherent overall agenda. While a deep approach to learning is seen as ideal, a surface approach to learning is primarily motivated by a fear of failure and reflects a reliance of rote-learning and memorization in isolation from other forms of knowledge and ideas (Dart, 1998; Diseth & Martinsen, 2003; Van Rossum & Schenk, 1984).

A third, strategic approach to learning, is underpinned by competition with others for desirable academic achievement outcomes. Students who engage in a strategic approach to learning will manage time effectively and align their intellectual abilities with the assessment criteria given reflective of higher-grade outcomes (Duff, 2003). Unlike the deep and surface approach to learning, the strategic approach to learning is more malleable in that it does not relate to a fixed strategy. Students will instead deploy whichever strategic behaviours they believe to be most beneficial to their overall outcome goals (Diseth & Martinsen, 2003). A strategic approach to learning may therefore combine aspects of both the deep and surface approaches to learning although the main motivation is academia achievement rather than intrinsic interest or fear of failure as is the case with the deep and surface approach respectively.

3 Methodology

The current study hypothesizes that personality traits and academic self-efficacy can be expected to orientate individual students toward certain goal orientations (achievement motivations), which will promote different approaches to learning and consequently, differentiations in academic

achievement. While the personality trait of conscientiousness seems the most likely to have a significant predictive impact, the mixed findings reported within the literature mean that a priori detailed hypothesized interactions are not made or modelled. In addition to assessments made on the basis of the overall cohort of student participants, the current study assesses how the predictor variables tested differentiate in their contribution to academic achievement between high-achiever and low-achiever students. Identifying significant differences between these two achievement samples will provide stakeholders with a rationale for the provision and content of student support services focused on facilitating more productive classroom behaviours and adaptive approaches to study, particularly within the context of mixed-ability learning environments.

Context and Participants

An overall sample of 256 students (204 (79.7%) male and 52 (20.3%) female) enrolled at a public information science university within Japan (mean age = 18.73 / SD= .82) participated in the current study. The students were recruited through an internal email invitation in Japanese. The secondary split samples each contained 128 students. The high-achiever group consisted of 104 (81.3%) males and 24 (18.8%) females (mean age = 18.64 / SD= .73). The low-achiever group consisted of 100 (78.1%) males and 28 (21.9%) females (mean age = 18.82 / SD= .89).

Procedure and Measures

The students who had consented to participate were sent a URL link to a Japanese language web-based survey. The survey comprised four main sections related to individual differences in learning.

Personality. The Japanese version of the Ten-Item Personality Inventory (TIPI) (Gosling et al., 2003) was used as the measure of personality. The TIPI-J has been shown to correlate sufficiently with the more extensive NEO-PI-R-J (Japanese version of the NEO Personality Inventory) and is considered an adequate representation of the five-factor model of personality (Oshio et al., 2012, 2013) (see also Furnham, 2008). The TIPI-J requires participants to self-report the extent to which they view themselves in relation to ten binary-pairs of personality trait

descriptors. These descriptors are assessed on a seven-point scale ranging from disagree strongly to agree strongly. The measure addresses personality traits from the five-factor model including extraversion (sociable, assertive, talkative, active, and not reserved, or shy), agreeableness (trusting, generous, sympathetic, cooperative, and not aggressive, or cold), conscientiousness (hard working, responsible, self-disciplined, thorough, and not careless, or impulsive), emotional stability (relaxed, self-confident, and not anxious, moody, easily upset, or easily stressed), and openness (curious, reflective, creative, deep, open-minded, and not conventional) (Gosling et al., 2003).

Academic Self-Efficacy. An eight-item measure of academic self-efficacy was modified from the Motivated Strategies for Learning Questionnaire (MLSQ) (Pintrich & De Groot, 1990). The items were assessed on a five-point scale and concerned perceptions of confidence and competence related to the student's enrolled courses (e.g., "I'm certain I can understand the ideas taught in my classes").

Goal Orientation (Achievement Motivation). An 18-item instrument was drawn from the Goal Orientation Scale developed by Midgley et al. (1998). The measure pertains to the achievement motivation of students and is divided into three factors. A task goal-orientation (e.g., "I like university work best when it really makes me think) concerns the goal to develop one's own study related abilities. An ability-approach orientation (e.g., "I would feel successful at university if I did better than most of the other students") concerns the goal to demonstrate one's own study related ability. An ability-avoid orientation (e.g., "The reason I do my university work is so others won't think I'm dumb") concerns the goal to avoid the demonstration of one's own lack of study related abilities or incompetence. All responses were assessed on a five-point scale.

Approaches to Learning. The 52-item Revised Approaches to Studying Inventory (RASI) developed by (Entwistle & Ramsden, 1983) was used. The measure uses a five-point scale to assess the tendencies of students to use deep, strategic and surface approaches to learning. While the 52-items can be used to reflect these three macro-level constructs (deep, strategic and surface), there also exist several

composite scales within each approach. Given the complexity of the measure, the authors have advised that the factor structures and reliability of each sub-scale and its composite construct should be checked rather than assumed within the particular population used.

Academic Achievement. Assessment data was provided by the university administration and reflected the sum of five compulsory course grades taken from the first semester during 2017 and 2018. The five subjects included Communication, Virtual English Program, Analytics, Linear Algebra and Practical Mathematics. All grades reflected a combination of assessment methods drawn over a 15-week semester period.

4. Results

Descriptive and Correlational Analysis

Each of the predictor variables was scored/coded based on the instructions given by the original instrument guidelines. While the measure of personality and academic self-efficacy ($\alpha .82$) required no factorial confirmation, the 18-items used to measure goal orientation (achievement motivation) were subject to a principal-components factor analysis. Six items returning cross-loading factor values under .55 and were removed. The revised five-item task goal-orientation factor ($\alpha .84$) accounted for 27.3% of the cumulative variance, the revised four-item ability-avoid orientation factor ($\alpha .80$) accounted for 24.6% of the cumulative variance while the revised three-item ability-approach factor ($\alpha .74$) accounted for 14.4% of the cumulative variance. Overall, the modified three-factor solution was responsible for 64.4% of the observed variance.

The procedure was then repeated with the 52-item Revised Approaches to Studying Inventory (RASI). Several cross-loading items returning factor values under .55 were removed. The revised 16-item deep approach to learning factor ($\alpha .84$) accounted for 32.6% of the cumulative variance, the revised 12-item strategic approach to learning factor ($\alpha .77$) accounted for 19.0% of the cumulative variance while the revised 16-item surface approach to learning factor ($\alpha .66$) accounted for 13.2% of the cumulative variance. Overall, the three-factor solution was responsible for 65.0% of the observed variance. Table 1 shows the

descriptive data for the overall sample as well as for the two split samples. Significant mean differences between the high-achiever and low-achiever samples are also shown.

Table 1. Descriptive data for the overall sample and the two split samples

	All Students (N=256) M / SD	High-Achievers (n=128) M / SD	Low-Achievers (n=128) M / SD	t
Personality Traits				
Extraversion	3.24 / 1.27	3.10 / 1.22	3.37 / 1.31	-1.67
Agreeableness	4.96 / .96	5.09 / .91	4.82 / 1.00	2.20*
Conscientiousness	3.20 / 1.02	3.45 / 1.07	2.95 / .91	3.99***
Emotional Stability	3.55 / 1.02	3.40 / .95	3.30 / 1.08	.79
Openness	3.98 / 1.27	4.00 / 1.26	3.96 / 1.28	.24
Academic Self-Efficacy				
	20.61 / 5.48	22.45 / 4.21	18.78 / 5.97	5.67***
Goal Orientation				
Task-Goal Orientation	17.98 / 3.73	18.39 / 3.04	17.57 / 4.39	1.74
Ability-Avoid Orientation	9.48 / 3.41	8.85 / 3.04	10.10 / 3.65	-2.97**
Ability-Approach Orientation	9.35 / 2.62	9.48 / 2.48	9.21 / 2.75	.81
Approaches to Learning				
Deep Approach (SM+RI+H+UE)	52.23 / 8.64	52.14 / 8.65	52.32 / 8.66	-.17
Seeking Meaning (SM)	12.50 / 2.64	12.20 / 2.69	12.79 / 2.57	-1.80
Relating Ideas (RI)	13.21 / 2.40	13.06 / 2.49	13.35 / 2.30	-.98
Interest in Ideas (IE)	12.92 / 2.83	12.92 / 3.00	12.85 / 2.66	-.08
Use of Evidence (UE)	13.58 / 2.51	13.95 / 2.39	13.21 / 2.59	-2.35*
Strategic Approach (OS+TM+AC)	32.57 / 6.34	33.21 / 6.09	31.93 / 6.55	1.62
Organized Studying (OS)	10.28 / 2.61	10.53 / 2.70	10.03 / 2.50	1.53
Time Management (TM)	9.97 / 2.85	10.23 / 2.59	9.71 / 3.08	1.44
Achieving (AC)	12.32 / 2.12	12.45 / 1.95	12.18 / 2.27	1.00
Surface Approach (UM+FF+L+P+SB)				
Unrelated Memorization (UM)	49.79 / 8.36	46.50 / 8.42	53.09 / 6.90	-6.84***
Fear of Failure (FF)	11.29 / 2.60	10.46 / 2.47	12.12 / 2.46	-5.35***
Lack of Purpose (LP)	13.55 / 3.28	12.87 / 2.86	14.23 / 3.53	-3.37***
Shallow-Boundedness (SB)	11.82 / 3.11	10.57 / 2.85	13.07 / 2.86	-6.98***
	13.11 / 2.78	12.57 / 3.05	13.65 / 2.37	-3.15**
Overall Achievement Outcome				
Communication Grade	400.00 / 35.46	431.79 / 9.57	368.20 / 19.89	32.59***
Virtual English Program Grade	79.12 / 7.98	82.96 / 6.21	75.28 / 7.72	8.77***
Virtual English Program Grade	80.78 / 10.54	87.60 / 5.12	73.96 / 10.16	13.55***
Analytics Grade	79.26 / 11.15	86.96 / 7.10	71.56 / 8.93	15.26***
Linear Algebra Grade	80.89 / 11.15	89.40 / 6.41	72.37 / 7.92	18.90***
Practical Mathematics Grade	79.92 / 9.28	84.84 / 7.47	75.01 / 8.28	9.96***

Bivariate correlations for the predictor variables and criterion variable are shown in Table 2. Among the personality trait predictors, extraversion was correlated with conscientiousness ($r = .15^*$) and openness ($r = .19^{**}$). Agreeableness was correlated with conscientiousness ($r = .12^*$). Conscientiousness was correlated with emotional stability ($r = .26^{**}$) and openness ($r = .15^*$). The personality trait predictors had several correlations with other predictor variables, the most significant of which was the positive correlation between conscientiousness and a strategic approach to learning ($r = .43^{**}$) and the negative correlation between openness and an ability-avoid orientation ($r = -.43^{**}$). Conscientiousness also had a positive correlation with a deep approach to learning ($r = .15^*$). Moreover, and consistent with Benjamin et al. (1981) who suggests that neurotic students are more likely to be ineffective and inefficient in terms of approaches to learning and cognitive strategy development, emotional stability had a negative correlation with surface approach to learning ($r = -.18^{**}$). Extraversion ($r = -.13^*$), conscientiousness ($r = .26^{**}$) and emotional stability ($r = .12^*$) were the only personality trait indicators to have direct correlations with the criterion variable.

Academic self-efficacy was correlated with all of the personality trait indicators except for extraversion. Consistent with previous studies (cf. Anderman & Young, 1994; Anderman & Midgley, 1997) academic self-efficacy was correlated with task goal-orientation ($r = .13^*$). Indicative of Schunk and Pajares (2002) who report that self-efficacy beliefs correlated with the use of effective learning strategies, academic self-efficacy had a positive correlation with an ability-approach orientation ($r = .56^{**}$), a deep approach to learning ($r = .22^{**}$), a strategic approach to learning ($r = .39^{**}$), and a negative correlation with a surface approach to learning ($r = -.16^{**}$). Academic self-efficacy had a direct correlation with the criterion variable ($r = .36^{**}$).

Table 2. Bivariate correlations of predictor and criterion variables (n=256)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1												
2	.15*	1											
3	.12*	.19**	1										
4	-.01	.05	.25**	1									
5	.19**	.07	-.18**	-.08	1								
6	.06	.21**	.32**	.31**	.12*	1							
7	.21**	.02	.18*	.16*	.20**	.13*	1						
8	-.15**	-.03	-.07	.00	-.43**	.10	-.05	1					
9	-.05	.22**	-.01	.18**	-.11	.56**	.03	.26**	1				
10	.25**	-.03	-.15*	.05	.10	.25**	.47**	.09	.07	1			
11	.28**	.15*	.43**	.03	.30**	.30**	.50**	.05	-.01	.21**	1		
12	-.18**	-.03	-.11	-.18**	-.21**	-.16**	-.25**	.33**	.09	-.04	-.04	1	
13	-.13*	.09	.26**	.12*	.03	.36**	.25**	-.14*	.01	.10	.18*	-.09**	1

Note: 1. Extraversion 2. Agreeableness 3. Conscientiousness 4. Emotional Stability 5. Openness 6. Academic Self-Efficacy 7. Task Goal Orientation 8. Ability-Avoid Goal Orientation 9. Ability-Approach Goal Orientation 10. Deep Approach to Learning 11. Strategic Approach to Learning 12. Surface Approach to Learning 13. Academic Achievement

The only correlation among the three goal-orientation (achievement motivation) predictors was between the ability-avoid orientation and the ability-approach orientation ($r = .26^{**}$). The task goal-orientation had a positive correlation with the strategic approach to learning ($r = .50^{**}$) and the deep approach to learning ($r = .47^{**}$) which supports the research showing that task goal-orientations are linked to adaptive learning strategies inclusive of deep information processing (cf. Anderman & Young, 1994; Nolen, 1988). The task goal-orientation also had a positive correlation with the criterion variable ($r = .25^{**}$) while the ability-avoid orientation had a negative correlation with the criterion variable ($r = -.14^*$). In addition, the ability-avoid orientation had a positive correlation with a surface approach to learning ($r = .33^{**}$) which relates to the implication that the avoidance-orientation is associated with other maladaptive learning behaviours (cf. Midgley et al., 2000).

Among the approaches to learning predictors variables a deep approach to learning had a

increased variance accounted for was also significant within the high-achiever sample ($\Delta R^2 = .23$; $F(3, 118) = 12.73^{***}$) and the low-achiever sample ($\Delta R^2 = .31$; $F(3, 118) = 24.62^{***}$). Differentiated patterns of significance were observed across the three goal-orientation (achievement motivation) predictors between the two samples. Within the high-achiever sample the ability-avoid orientation ($\beta = -.55^{***}$) was a negative predictor of academic achievement whereas the ability-approach orientation ($\beta = .45^{**}$) was a positive predictor. Within the low-achiever sample, task-goal orientation ($\beta = .58^{***}$) and ability-avoid approach orientation ($\beta = .24^*$) were positive predictors of academic achievement whereas the ability-approach orientation ($\beta = -.27^{**}$) was a negative predictor.

In step four, the three approaches to learning predictors were introduced. Within the high-achiever sample, although the overall model was significant ($F(12, 115) = 3.85^{***}$), when controlling for personality, academic self-efficacy and goal-orientation (achievement motivation) predictors, the three approaches to learning predictors made no significant contribution. Within the low-achiever sample the overall model returned was significant ($F(12, 115) = 11.74^{***}$) and the three approaches to learning predictors significantly increased the overall variance accounted for by 4% ($\Delta R^2 = .04$; $F(3, 115) = 4.05^{**}$) although only the surface learning approach ($\beta = -.22^{**}$) was a significant predictor of academic achievement. The final model for the high-achiever sample was able to account for approximately 28% of the observed variance whereas the final model for the low-achiever sample was able to account for approximately 55% of the observed variance.

5. Discussion

Informed by a social cognitive approach to self-regulation and learning (Zimmerman, 2002), the current study hypothesized that personality traits and academic self-efficacy could be expected to orientate individual students toward certain goal orientations (achievement motivations), which would promote different approaches to learning and consequently, differentiations in academic achievement. In addition to assessing the predictive validity of a selection of personality, motivation and study related variables to

the academic achievement outcomes of a population of Japanese university students, the current study also tested how such variables differentiated in their contribution to academic achievement between students categorized as high-achievers and students categorized as low-achievers. From the data analyzed, several findings have arisen that can be discussed in relation to the role of individual differences in academic achievement outcomes and the practical implications created for teachers and other stakeholders within higher education.

First, the sequential regression analysis undertaken with the overall sample was able to account for approximately 41% of the variance observed in academic achievement whereas within the split sample procedure, 55% was accounted for among the low-achiever sample and 28% among the high-achiever sample. The predictor variables selected were therefore more effective in explaining the academic achievement outcomes of low-achievers as opposed to high-achievers. It might be suggested that within the high-achiever sample intelligence is responsible for a greater proportion of the unexplained variance rather than the non-cognitive factors tested in the current study.

Second, across the overall sample and the split-samples, the most significant addition to the cumulative variance accounted for came from the introduction of the three goal-orientation (achievement motivation) variables. Despite this commonality, between the high-achievers and low-achievers there are distinct differentiations in the contributions made by each of the three goal-orientation indicators. Among the high-achievers an ability-approach orientation ($\beta = .45^{**}$) made the strongest positive impact on academic achievement whereas an ability-avoid approach made the strongest negative impact ($\beta = -.55^{***}$). This suggests that those students who had the required abilities for successful participation in class (i.e., high-achievers) saw significant returns in terms of academic achievement when actually demonstrating their abilities in front of peers and teachers. Likewise, when these capable students sought to avoid demonstrations of individual incompetence or lack of knowledge and ability, their academic achievements were reduced.

A task goal-orientation was not a significant predictor of academic achievement among the high-achiever sample which raises questions concerning the value of self-referential processes of evaluation among students who are equipped with the sufficient competencies required to receive positive feedback from others. In contrast, among the low-achiever sample the task-goal orientation was found to have the greatest individual positive impact on academic achievement ($\beta = .58^{***}$). This suggests that a self-referential focus on task completion is the most productive motivation for low-achievers to be successful within the classroom alongside an ability-avoid orientation ($\beta = .24^*$) which had a positive rather than negative impact on academic achievement. Given that the task goal-orientation is measured in self-referential terms as opposed to being dependent upon external feedback, it appears important to therefore provide such students with the skills and abilities needed for self-reflection and meta-awareness in relation to their learning experiences. Within the low-achiever sample, the ability-approach orientation was found to have a negative predictive impact on academic achievement ($\beta = -.27^{**}$). This indicates that for the low-achievers, attempts at demonstrating knowledge and ability did not yield positive feedback returns from peers and teachers meaning that avoidance was a more successful motivational orientation.

Third, within the high-achiever sample, academic self-efficacy had no significant predictive impact upon academic achievement whereas for the low-achiever sample, academic self-efficacy did have a significant predictive impact upon academic achievement ($\beta = .20^*$), albeit one which made no significant contribution to the model when controlling for the other predictor variables. From this it is possible to assert that while academic self-efficacy is more important among low-achievers than high-achievers, the impact of academic self-efficacy on achievement outcomes within the current study is marginal although this is perhaps due to limitations in sample size as the overall population returned a significant positive role for academic self-efficacy.

Fourth, among the high-achiever sample personality traits made a non-significant contribution

to the overall model whereas within the low-achiever sample the introduction of the personality traits accounted for approximately 17% of the cumulative variance observed. This suggests that personality traits are more influential for low-level learners than high-achiever learners, possibly as personality shapes actual learning behaviours and motivation as mediators of academic achievement (cf. Sorić et al., 2017). Indeed, among the low-achiever sample, conscientiousness was the only trait to have a significant predictive impact upon academic achievement ($\beta = .32^{***}$). The contribution of conscientiousness is consistent with past studies (cf. Chamorro-Premuzic & Furnham, 2003; Farsides & Woodfield, 2003; Kappe & Van der Flier, 2012) that have described it as “the crucial noncognitive predictor for school achievement” (Dumfart & Neubauer, 2016, p. 8). Crozier (1997) facilitates an understanding of how these interactions might manifest in practice by detailing how conscientious students are more inclined to meet assignment deadlines, complete all given tasks and activities, invest more effort into their work and are more inclined to be able to work independently without constant supervision. It can be speculated upon whether conscientious learning behaviours are able to offset a lack of intelligence, and likewise, whether higher levels of intelligence are able to negate the need for students to engage in productive learning behaviours.

Finally, none of the approaches to learning variables made a significant contribution to the final model among the high-achiever sample although among the low-achiever sample the three variables accounted for approximately 4% of the cumulative variance observed. Within the low-achiever sample a surface approach to learning was the only one of the three approaches to learning variables to have any predictive impact ($\beta = -.22^{**}$) on academic achievement. As the literature indicates, learners who adopt a surface approach to learning view learning as an external imposition and a process that is externally motivated by a fear of failure (cf. Dart, 1998; Diseth & Martinsen, 2003; Duff, 2004; Van Rossum & Schenk, 1984). The fact that a deep approach to learning and a strategic approach to learning made no significant contribution, despite the significant positive

correlations observed, suggests that academic achievement within the current sample was not positively influenced by the approach to learning taken but rather more by levels of conscientiousness and the degree to which the students adopted effective achievement motivations.

6. Conclusion

Individual differences and other non-cognitive factors play a significant role in the achievement outcomes of university students and there remains a strong need to undertake research which highlights the contributions made by different variables, within different contexts and among different samples of student. Departing from O'Connor and Paunonen's (2007) recommendation that researchers use multiple predictors inclusive of personality, motivation and study habits when predicting academic achievement outcomes, the current study has assessed the predictive capacity of a selection of variables to account for the academic achievements of a cohort of Japanese university students.

The results of the current study indicate that across the whole sample in addition to the split samples, goal orientation (achievement motivation) is the crucial factor in predicting academic achievement. Within the high-achiever and low-achiever sample goal orientation was by far the most important factor in predicting success. Crucial for the low-achiever students, conscientiousness also appears to be a prerequisite to successful achievement outcomes. It is therefore imperative that educators promote to students a conscientious approach to learning. While teacher intervention into the domain of personality may be limited due to the developmental nature of each trait, educational practitioners are able to intervene on the basis of student choices informed by personality traits, especially when certain traits such as extraversion and neuroticism have been shown to have detrimental effects in terms of learning behaviours, and thus, academic achievement outcomes.

Which goal orientation is optimal for each student appears to be dependent on factors such as intelligence rather than personality of academic self-efficacy. This presents a challenge for teachers and educational practitioners as achievement, as a

problematic indicator of intelligence, is often not known until after a course of study. It is therefore important for teachers to develop ways to identify students on the basis of ability and to then tailor specific initiatives, interventions or types of attributional feedback to their abilities, something which in large-sized mixed ability classrooms is problematic.

References

- Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology*, 84(3), 261-271.
- Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of Educational Psychology*, 80(3), 260-267.
- Anderman, L. H., & Anderman, E. M. (1999). Social predictors of changes in students' achievement goal orientations. *Contemporary Educational Psychology*, 25, 21-37.
- Anderman, E. M., & Midgley, C. (1997). Changes in achievement goal orientations, perceived academic competence, and grades across the transition to middle-level schools. *Contemporary Educational Psychology*, 22, 269-298.
- Anderman, E. M., & Young, A. I. (1994). Motivation and strategy use in science: Individual differences and classroom effects. *Journal of Research in Science Teaching*, 31, 811-831.
- Atkinson, J. W., & Feather, N. T. (1964). *A theory of achievement motivation*. New York, NY: Wiley.
- Bandura, A. (1977). *Social learning theory*. Oxford: Prentice-Hall.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: W. H. Freeman.
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, 52(1), 1-26.
- Bauer, K. W., & Liang, Q. (2003). The effect of personality and precollege characteristics on first-year activities and academic performance. *Journal of College Student Development*, 44, 277-290.

- Bidjerano, T., & Yun Dai, D. (2007). The relationship between the big-five model of personality and self-regulated learning strategies. *Learning and Individual Differences*, 17, 69-81.
- Bratko, D., Chamorro-Premuzic, T., & Saks, Z. (2006). Personality and school performance: incremental validity of self- and peer-ratings over intelligence. *Personality and Individual Differences*, 41, 131-142.
- Busato, V. V., Prins, F. J., Elshout, J. J., & Hamaker, C. (1999). The relation between learning styles, the Big Five personality traits and achievement motivation in higher education. *Personality and Individual Differences*, 26, 129-140.
- Cattell, R. B. (1973). *Personality and mood by questionnaire*. New York, NY: Jossey-Bass.
- Chamorro-Premuzic, T., & Furnham, A. (2003). Personality predicts academic performance: Evidence from two longitudinal studies on British university students. *Journal of Research in Personality*, 37(4), 319-338.
- Chamorro-Premuzic, T., & Furnham, A. (2005). *Personality and intellectual competence*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Conard, M. A. (2006). Aptitude is not enough: How personality and behavior predict academic performance. *Journal of Research in Personality*, 40, 339-346.
- Crozier, W. R. (1997). *Individual learners: Personality differences in education*. London: Routledge.
- Dart, B. (1998). Teaching for improved learning in smaller classes. In B. Dart & G. Boulton-Lewis (Eds.), *Teaching and learning in higher education* (pp. 222-249). Melbourne: ACER Press.
- De Fruyt, F., & Mervielde, I. (1996). Personality and interests as predictors of educational streaming and achievement. *European Journal of Personality*, 10, 405-425.
- De Raad, B., & Schouwenburg, H. C. (1996). Personality in learning and education: A review. *European Journal of Personality*, 10, 303-336.
- Digman, J. M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology*, 41(1), 417-440.
- Diseth, A., & Martinsen, Ø. (2003). Approaches to learning, cognitive style, and motives as predictors of academic achievement. *Educational Psychology*, 23, 195-207.
- Dollinger, S. J., & Orf, L. A. (1991). Personality and performance in personality: Conscientiousness and openness. *Journal of Research in Personality*, 25, 276-284.
- Dowker, A., Sarkar, A., Looi, C. Y. (2016). Mathematics anxiety: What have we learned in 60 years? *Frontiers in Psychology*, 7: Article 508.
- Duff, A. (2003). Quality of learning on an MBA programme: The impact of approaches to learning on academic performance. *Educational Psychology*, 23, 123-139.
- Dumfart, B., & Neubauer, A.C. (2016). Conscientiousness is the most powerful noncognitive predictor of school achievement in adolescents. *Journal of Individual Differences*, 37(1), 8-15.
- Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist*, 41(10), 1040-1048.
- Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, 95, 256-273.
- Eccles, J. (1983). Expectancies, values and academic behaviors. In J. T. Spence (Ed.), *Achievement and achievement motives* (pp. 75-146). San Francisco, CA: Freeman.
- Elliot, A. J., & Harackiewicz, J. M. (1996). Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *Journal of Personality and Social Psychology*, 70, 461-475.
- Elliot, A. J., & Thrash, T. M. (2001). Achievement goals and the hierarchical model of achievement motivation. *Educational Psychology Review*, 13, 139-156.
- Entwistle, N. J., & Entwistle, D. (1970). The relationships between personality, study methods and academic performance. *British Journal of Educational Psychology*, 40, 132-143.
- Entwistle, N. J., & Ramsden, P. (1983). *Understanding student learning*. London: Croom Helm.
- Farsides, T., & Woodfield, R. (2003). Individual differences and undergraduate academic success: The roles of personality, intelligence, and application. *Personality and Individual Differences*, 34(7), 1225-1243.
- Furnham, A. (2008). Relationship among four Big

- Five measures of different length. *Psychological Reports*, 102(1), 312-316.
- Furnham, A., & Chamorro-Premuzic, T. (2004). Personality and intelligence as predictors of statistics examination grades. *Personality and Individual Differences*, 37(5), 943-955.
- Furnham, A., Chamorro-Premuzic, T., & McDougall, F. (2003). Personality, cognitive ability, and beliefs about intelligence as predictors of academic performance. *Learning and Individual Differences*, 14, 49-66.
- Goff, M., & Ackerman, P. L. (1992). Personality-intelligence relations: Assessment of typical intellectual engagement. *Journal of Educational Psychology*, 84, 537-552.
- Gosling, S. D., Rentfrow, P. J., & Swann, W. B. Jnr. (2003). A very brief measure of the Big Five personality domains. *Journal of Research in Personality*, 37, 504-528.
- Gray, E. K., & Watson, D. (2002). General and specific traits of personality and their relation to sleep and academic performance. *Journal of Personality*, 70, 177-206.
- Guay, F., Ratelle, C. F., Roy, A., & Litalien, D. (2010). Academic self-concept, autonomous academic motivation, and academic achievement: Mediating and additive effects. *Learning and Individual Differences*, 20, 644-653.
- Hair, P., & Hampson, S. E. (2006). The role of impulsivity in predicting maladaptive behaviour among female students. *Personality and Individual Differences*, 40, 943-952.
- Hakimi, S., Hejazi, E., & Lavasani, M. G. (2011). The relationships between personality traits and students' academic achievement. *Procedia-Social and Behavioral Sciences*, 29, 836-845.
- Harackiewicz, J. M., Barron, K. E., & Elliot, A. J. (1998). Rethinking achievement goals: When are they adaptive for college students and why? *Educational Psychologist*, 33, 1-21.
- Harris, D. (1940). Factors affecting college grades: a review of the literature, 1930-1937. *Psychological Bulletin*, 37, 125-166.
- John, O. P., & Srivastava, S. (1999). The Big-Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds), *Handbook of personality: Theory and research* (pp. 102-138). New York, NY: Guilford.
- Juvonen, J., Espinoza, G., & Knifsend, C. (2012). The role of peer relationships in student academic and extracurricular engagement. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 387-401). New York, NY: Springer Science + Business Media.
- Kappe, R., & Van der Flier, H. (2012). Predicting academic success in higher education: What's more important than being smart? *European Journal of Psychology of Education*, 27(4), 605-619.
- Khalaila, R. (2015). The relationship between academic self-concept, intrinsic motivation, test anxiety, and academic achievement among nursing students: Mediating and moderating effects. *Nurse Education Today*, 35, 432-438.
- Kolb, D. A. (1984). *Experiential learning*. Englewood Cliffs, NJ: Prentice-Hall.
- Komarraju, M., Karau, S. J., & Schmeck, R. R. (2009). Role of the Big Five personality traits in predicting college students' academic motivation and achievement. *Learning and Individual Differences*, 19, 47-52.
- Komarraju, M., Karau, S. J., Schmeck, R. R., & Avdic, A. (2011). The Big Five personality traits, learning styles, and academic achievement. *Personality and Individual Differences*, 51(4), 472-477.
- Laidra, K., Pullmann, H., & Allik, J. (2007). Personality and intelligence as predictors of academic achievement: A cross-sectional study from elementary to secondary school. *Personality and Individual Differences*, 42, 441-451.
- Lounsbury, J.W., Sundstrom, E., Loveland, J.M., & Gibson, L.W. (2003). Intelligence, 'Big Five' personality traits, and work drive as predictors of course grade. *Personality and Individual Differences*, 35(6), 1231-1239.
- Marton, F., & Saljo, R. (1976). On qualitative differences in learning: I—outcome and process. *British Journal of Educational Psychology*, 46, 4-11.
- Mega, C., Ronconi, L., & De Beni, R. (2014). What makes a good student? How emotions, self-regulated learning, and motivation contribute to academic achievement. *Journal of Educational Psychology*, 106(1), 121-131.

- Messick, S. (1994). The matter of style: Manifestations of personality in cognition, learning, and teaching. *Educational Psychologist*, 29, 121-136.
- Midgley, C., Kaplan, A., Middleton, M., Maehr, M. L., Urdan, T., Anderman, L. H., Anderman, E., & Roeser, R. (1998). The development and validation of scales assessing students' achievement goal orientations. *Contemporary Educational Psychology*, 23, 113-131.
- Midgley, C., Maehr, M. L., Huda, L., Anderman, E. M., Anderman, L., Freeman, K. E., Gheen, M., Kaplan, A., Kumar, R., Middleton, M. I., Nelson, I., Roeser, R., & Urdan, T. (2000). Manual for the patterns of adaptive learning scales (PALS). Ann Arbor, MI: University of Michigan.
- Noftle, E., & Robins, R. (2007). Personality predictors of academic outcomes: Big Five correlates of GPA and SAT scores. *Journal of Personality and Social Psychology*, 93, 116-130.
- Nolen, S. B. (1988). Reasons for studying: Motivational orientations and study strategies. *Cognition and Instruction*, 5, 269-287.
- O'Connor, M.C., & Paunonen, S.V. (2007). Big Five personality predictors of post-secondary academic performance. *Personality and Individual Differences*, 43, 971-990.
- Oshio, A., Abe, S., & Cutrone, P. (2012). Development, reliability, and validity of the Japanese version of Ten Item Personality Inventory (TIPI-J). *The Japanese Journal of Personality*, 21, 40-52.
- Oshio, A., Abe, S., Cutrone, P., & Gosling, S. D. (2013). Big Five content representation of the Japanese version of the Ten-Item Personality Inventory. *Psychology*, 4(12), 924-929.
- Pajares, F. (1996). Self-efficacy beliefs in academic setting. *Review of Educational Research*, 66(4), 543-578.
- Paris, S. G., & Paris, A. H. (2001). Classroom applications of research on self-regulated learning. *Educational Psychologist*, 36(2), 89-101.
- Pekrun, R., & Linnenbrink-Garcia, L. (2012). Academic emotions and student engagement. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 259-282). New York, NY: Springer Science + Business Media.
- Pintrich, P. R. (1989). The dynamic interplay of student motivation and cognition in the college classroom. In C. Ames & M. L. Maher (Eds.), *Advances in motivation and achievement* (Vol. 6) (pp. 117-160). Greenwich, CT: JAI Press.
- Pintrich, P. R., & Schunk, D. H. (1996). *Motivation in education: Theory, research and applications*. Englewood Cliffs, NJ: Prentice Hall.
- Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, 82(1), 33-40.
- Poropat, A. E. (2009). A meta-analysis of the Five-factor model of personality and academic performance. *Psychological Bulletin*, 135, 322-338.
- Richardson, M. Bond, R., & Abraham, C. (2012). Psychological correlates of university students' academic performance: A systematic review and meta-analysis. *Psychological Bulletin*, 138(2), 353-387.
- Rimfield, K., Kovas, Y., Dale, P.S. and Plomin, R. (2016). True grit and genetics: predicting academic achievement from personality. *Journal of Personality and Social Psychology*, 111(5), 780-789.
- Robbins, S.B., Lauver, Le.H., Davies, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. *Psychology Bulletin*, 130(2), 261-288.
- Rothstein, M. G., Paunonen, S. V., Rush, J. C., & King, A. (1994). Personality and cognitive ability predictors of performance in graduate Business School. *Journal of Educational Psychology*, 86(4), 516-530.
- Ruban, L. M., & McCoach, D. B. (2005). Gender differences in explaining grades using structural equation modelling. *Review of Higher Education*, 28, 475-502.
- Schmeck, R. R. (1983). Learning styles of college students. In R. Dillon, & R. R. Schmeck (Eds.), *Individual differences in cognition* (pp. 233-279). New York, NY: Academic Press.
- Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educational Psychologist*, 26, 207-231.
- Schunk, D.H., & Pajares, F. (2002). The development of academic self-efficacy. In A. Wigfield & J. Eccles (Eds.), *Development of achievement motivation* (pp. 15-31). San Diego, CA: Academic Press

- Song, J., Bong, M., Lee, K., & Kim, S. (2015). Longitudinal investigation into the role of perceived social support in adolescents' academic motivation and achievement. *Journal of Educational Psychology, 107*(3), 821-841.
- Stajkovic, A. D., & Luthans, F. (1998). Self-efficacy and work-related performance: A Meta-analysis. *Psychological Bulletin, 124*(2), 240-261.
- Van Rossum, E. J., & Schenk, S. M. (1984). The relationship between learning conception, study strategy and learning outcome. *British Journal of Educational Psychology, 54*, 73-83.
- Vedel, A. (2016). Big Five personality group differences across academic majors: A systematic review. *Personality and Individual Differences, 92*, 1-10.
- Vermunt, J. D. (1996). Metacognitive, cognitive and affective aspects of learning styles and strategies: A phenomenographic analysis. *Higher Education, 31*, 25-50.
- Vroom, V. H. (1964). *Work and motivation*. Oxford: Jossey-Bass.
- Watson, D. (2000). *Mood and temperament*. New York: Guilford Press.
- Watson, D., & Clark, L. A. (1984). Negative affectivity: The disposition to experience aversive emotional states. *Psychological Bulletin, 96*(3), 465-490.
- Webb, E. (1915). *Character and intelligence: An attempt at an exact study of character*. Cambridge: Cambridge University Press.
- Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological Review, 92*(4), 548-573.
- Wood, R. E., & Bandura, A. (1989). Impact of conceptions of ability on self-regulatory mechanisms and complex decision making. *Journal of and Social Psychology, 56*, 407-415.
- Wolfe, R. N., & Johnson, S. D. (1995). Personality as a predictor of college performance. *Educational and Psychological Measurement, 55*, 177-185.
- Zhou, M. (2015). Moderating effects of self-determination in the relationship between Big Five personality and academic performance. *Personality and Individual Difference, 86*, 385-389.
- Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology, 25*(1), 82-91.
- Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice, 41*(2), 64-70.
- Zimmerman, B. J., & Bandura, A. (1994). Impact of self-regulatory influences on writing course attainment. *American Educational Research Journal, 31*(4), 845-862.